THE PRACTITIONER'S HANDBOOK OF TREATMENT

The Practitioner's Handbook of Treatment

OR

The Principles of Therapeutics

BY THE LATE

J. MILNER FOTHERGILL, M.D., M.R.C.P.

Physician to the City of London Hospital for Diseases of the Chest, Victoria Park
Foreign Associate Fellow of the College of Physicians of Philadelphia

Fourth Edition

EDITED AND IN GREAT PART REWRITTEN BY

WILLIAM MURRELL, M.D., F.R.C.P.

Physician to and Lecturer on Pharmacology and Therapeutics at the Westminster Hospital
Late Examiner in Materia Medica in the University of Edinburgh, and
Examiner in Materia Medica and Pharmacy to the Conjoint Board of the Royal College of Surgeons of England and the Royal College of Physicians of London

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PREFACE TO THE FOURTH EDITION

In the Preface to the First Edition of this work, Dr. Milner Fothergill points out that it is not "an imperfect Practice of Physic, but an attempt of original character to explain the *rationale* of our therapeutic measures. First the physiology of each subject is given, then the pathology is reviewed, so far as they bear upon the treatment; next the action of remedies is examined; after which their practical application in concrete prescriptions is furnished. It is not essayed to give prominence to new remedies or new therapeutic measures, so much as to analyze and elucidate the *modus operandi* of the measures in common use. It is designed to furnish to the practitioner reasons for the faith that is in him; and is a work on medical tactics for the bedside rather than the examination table."

The fact that a large edition was exhausted in a short time afforded conclusive evidence that the design of the work was found acceptable by those for whom it was intended. The practical nature of the book appealed essentially to the advanced student. To again quote Dr. Fothergill:—"Such a treatise gives him the broad lines

upon which he must proceed in his therapeutic efforts ;— the basis upon which he can rear a superstructure that will embrace minutiæ, the importance of which may not be very comprehensible without such underlying basis. The practitioner can compare his own practice with the lines here laid down, and note the points of agreement."

Dr. Fothergill died on June 28, 1888. He had suffered for many years from glycosuria, with occasional attacks of gout, and the immediate cause of death was gangrene of the foot and diabetic coma. The following is an extract from the obituary notice which appeared in the *Lancet* :—

" Dr. Fothergill was known to a large circle personally, but to a still wider circle by his writings. His physique and his powerfully marked mental characteristics would have made him a striking figure in any walk of life, and he certainly succeeded in realizing what he used to say every man should do—viz., to leave behind a strong impress of a distinct individuality. Gifted, in spite of his ponderous bulk, with an immense power of work and an indomitable energy, one can nevertheless admire the way in which he bravely struggled against difficulties, many of them connected with his own health. In his profession he exhibited great natural skill in interpreting the indications for treatment of disease, and in many cases of difficulty he would clear up the lines of treatment with a hand that was felt to be masterly. This may be well seen in his work on the *Heart and its Diseases*, and in the *Practitioner's Handbook of Treatment*, both of which have been extensively read. Dr. Fothergill did excellent service in frequently declaiming against the tendency to employ

the stethoscope and other instruments of precision in the search after physical signs, to the neglect of the study of the rational symptoms of disease; and he constantly warned students and young practitioners against attending to pathological and histological minutiæ to the exclusion of broader views. Throughout his writings there is to be found much shrewd and practical advice to students, to an extent that is noteworthy in the case of one who was not actually engaged in medical tuition. Physiology was a branch of study which Dr. Fothergill cultivated and employed in all that he published, as will be seen particularly in his book entitled the *Physiological Factor in Diagnosis*, which is full of racy reading. Nor did he ever tire of pointing out, in a very forcible manner, how surely physiological inquiries guide us in the right direction in our therapeutics, and 'light up areas never to be successfully illumined by empiricism.' . . . The announcement of Dr. Fothergill's death will be received with sorrow both in this country and also across the Atlantic, where his publications had brought him a wide reputation. Those who knew him personally will miss one who, with all his forcible, impetuous, and emphatic manner, could show himself a warm friend; while those who were only acquainted with him through his writings will sincerely regret that the pen which always wrote what was instructive in a vivacious and interesting, oftentimes original and pungent, style is for ever laid aside."

The enormous progress in all departments of medicine during the last ten years has necessitated a thorough revision of the work. Considerable additions have been

made, but Dr. Fothergill's original design, and above all his characteristic style, have as far as possible been preserved. No attempt has been made to introduce new remedies or new therapeutical measures, merely for the sake of novelty, and the prescriptions scattered throughout the work are on the lines with which Dr. Fothergill has made his readers in all parts of the world familiar, and which he employed with so much success in his own practice.

WILLIAM MURRELL.

17 *Welbeck Street, Cavendish Square,*
London, W.

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ERRATUM

Page 275, lines 14, 25, *for* Salacin *read* Salicin

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CHAPTER I

INTRODUCTION

§ 1. The ultimate aim of all medical research is the treatment and prevention of disease. It is eminently desirable that a medical man should be generally well-informed; but what is to be still more devoutly wished for is that he should be a skilful practitioner. It is quite possible to be the one without being the other. The combination is what we hope to see accomplished. The tendency of modern medical teaching has been rather to produce the first, leaving the second quality to develop itself, or to remain in a condition of imperfect evolution. We constantly hear it asserted that the highly-educated medical men of the present generation are not more successful in practice than their less accomplished but more practical predecessors. Even members of the profession are to be found who assert that the man under whose treatment they would place themselves, if seriously ill, is the old-fashioned general practitioner. This is a serious reproach to our recent advances in scientific medicine; to our modern instruments of precision in diagnosis; and even to our progress in rational therapeutics, in late years.

§ 2. In order to understand how progress in one direction may exist without corresponding advance in other directions, indeed with a certain amount of retrograding in some respects,

we must clearly distinguish between medicine as an art and medicine as a science. At present, the aspect usually presented to us by medicine is that of it as a science. We are beginning to have precise notions about the rational consequences of valvular disease of the heart, and to see why one set of consequences results from a defect in one valve, and why a totally different series of result follows from imperfection in another valve. We have learnt to distinguish the locality of disease in the brain from the various disturbances produced in it, according to the functions of the part affected. We have learnt the lesson that much of the disease of advanced life is due to imperfect elimination of nitrogenized waste. The relation of mental conditions to bodily derangements is dawning upon us in the ordinary diseases of the sane. Physiological inquiries are moreover pointing out to us the right direction of our therapeutic measures, and lighting up areas never to be successfully illumined by empiricism. For instance, the treatment of angina pectoris by nitrite of amyl and nitroglycerine was the logical outcome of certain physiological inquiries as to the action of these drugs, together with exact observations as to the actual condition of the circulation during the attack. The experiments of Oscar Liebreich and other pharmacologists have given us chloral hydrate, sulphonal and trional, all of them hypnotics of the greatest value. The observation that strychnine and atropine are direct stimulants to the respiratory centre in the medulla, affords us the means of improving the respiration when embarrassed; just as digitalis and strophanthus stimulate the action of the heart when failing. The stethoscope, the laryngoscope, the ophthalmoscope, the sphygmograph, the thermometer, the urinometer, the Röntgen rays, and cognate diagnostic aids, have done much for us in the recognition of disease. By the aid of skiagraphy the surgeon can ascertain with precision the position of foreign bodies in the structures and organs, he can confirm the diagnosis of fractures, and can ascertain the exact nature of obscure injuries to the bone. The detection of masses of tubercle in the lung, of pleuritic effusions and other gross pathological changes in the internal organs may be made apparent in the same way. The microscope has rendered services to medicine as an art as well as a science. It has cleared up the nature of a whole class of skin diseases

hitherto shrouded in mystery; while in the recognition of certain internal affections it is simply invaluable. Such are some of the important steps recently taken in that division known as the science of medicine.

In the art of medicine vast strides are being made daily in the direction of diagnosis. In the field of bacteriology various methods of investigation have been established on a sound scientific footing for purely diagnostic purposes. The injection of malleïn into a horse that has been exposed to the infection of glanders will show whether or not the animal has contracted the disease. This malleïn is prepared in the same way as Koch's tuberculin, and consists of the chemical products in the artificial cultures of the glanders bacilli. Then again the biological test of culture outside the body shows us when a sore-throat is due to the specific invasion of the diphtheria bacillus. Another important step is the detection of enteric fever by means of certain qualities acquired by the blood of a patient suffering from this malady. There is no more difficult problem in the whole range of practical medicine than to decide as to the presence of typhoid fever in certain obscure and atypical forms. Now, any doubt can be at once removed by the simple expedient of exposing living bacilli typhosi to the blood serum of the affected person and examining a drop-culture thus obtained under the microscope. If the serum be drawn from a patient suffering from enteric fever, sometimes as early as the fifth, and always on the seventh, day, a remarkable series of phenomena results. The main facts that characterize the test are a slight change of shape, and a loss of mobility on the part of the bacilli, and their running together into clusters or "clumps."

As our instruments of precision have become more numerous, as well as more exact and trustworthy, we have insensibly come to regard the information thus furnished to us as of primary importance; until the information derived from a careful collection of rational symptoms, from a cautious consideration of the general condition, has been awarded a subordinate position. In fact, we attach an exaggerated importance to one series of facts, and under-estimate the value of others. At present physical signs preponderate in the

mind of the practitioner over rational symptoms, to the detriment of the patient, and possibly to the discredit of the profession. The public cannot be expected to estimate us by any other measure than that of our usefulness. It is all very well for a patient to feel that his medical man is carefully trained in physical examination, and capable of constructing a skilful diagnosis; but the essential thing after all is confidence in his power to aid him when stricken and prostrated by disease or accident. The latter is our actual business and occupation in life; and it is here that success is most to be desired. We can now perform the longest and most excruciating operations without the patient feeling one pang of suffering: we can give relief by hypodermic injections of morphine more speedily, efficiently, and perhaps with less of those undesirable after-effects of morphine, than we could ere this invention. We can relieve pain by the use of cocaine and eucaine, and we can dilate the pupil by means of homatropine and scopolamine with the minimum of inconvenience to the patient. We can enable an injured heart to develop compensatory growth, and so, in many cases, preserve for years valuable lives, which until recently must have soon been lost to us. By our improvements in facilitating nutrition and by the use of extract of malt and peptonized foods we can rear successfully myriads of children who but a generation ago would have swelled the death-rate of those who die under five years of age. By a carefully-selected diet and the administration of morphine the diabetic patient can be preserved a useful life, for years.

The progress of medical science in the department of Gynæcology has been equally marked. "We have not to go back many decades to find the time when a gynæcologist was fully armed in possessing a few pessaries with a speculum and a lunar caustic stick, and I am old enough to remember when nearly every suffering woman with a pelvic ailment was thought hysterical and neither a fit subject for medical treatment nor sympathy. To call to mind the opinions of those who doubted there were such ailments as hydro- or pyo-salpinx, and curiously enough supported their arguments by appeals to 'post-mortem' records. To recollect when extra-uterine gestation was an almost

unknown ailment, and when death from internal hæmorrhage was considered a sufficient explanation to satisfy all requirements. To call to mind numbers of women, dying in a state of collapse from a ruptured pregnant tube, who would now be almost to a certainty saved by operation. To remember when that barbarous procedure, craniotomy, was a thing of frequent occurrence in case of difficult delivery, instead of being reserved for very exceptional cases, and only resorted to when the child is dead and other more purely surgical means are unavailable or have failed. To recollect when myoma uteri was supposed to be a trifling disorder and to claim its numerous victims from hæmorrhage, exhaustion, or sepsis, without a question of operation being raised, except in the case of polypus; and when women with cancer of the uterus were condemned to a lingering and painful death, without hope of relief or prolongation of life" (Mayo Robson).

Ovariotomy is now performed with an all round mortality of five per cent. or less, and a ruptured extra-uterine gestation is no longer almost certain death, but in good hands means an almost certain recovery. Hysterectomy for myoma involves actually little more risk than ovariotomy, whilst hysterectomy for cancer is successful so far as life is concerned in from ninety to ninety-five per cent. of the cases. Moreover Cæsarian section and Porro's operation are undertaken with the full assurance that in a large percentage the lives of both mother and child will be saved.

In special departments such as Dermatology equally good progress has been made, and in illustration of the fact it is sufficient to indicate the classical researches of Dr. Colcott Fox and Dr. Blaxall on the Pleurality of Ringworm Fungi.

In the treatment of accidental poisoning new and improved antidotes have been introduced, and many cases which a decade since would have been abandoned as hopeless are now treated with success. We have learnt that too much reliance may be placed on the older chemical tests, and we have sought for new and better means of detecting and estimating quantitatively some of the commoner toxic agents. Dr. Wilson Hake has done much valuable work in this direction, and Dr. Bernard Dyer has recently pointed out that there is "some degree of uncertainty in Marsh's when it is relied on for the quantitative

estimation of very minute quantities of arsenic." Dr. Dyer says—"I say this is the result of numerous experiments of my own, in which known minute quantities of arsenic have been added to the Marsh apparatus under different circumstances and with different kinds of zinc."

A vast number of valuable therapeutic agents have been introduced into practice during the last thirty years. As Mr. Martindale pointed out in his Presidential Address delivered before the Pharmaceutical Conference, the year 1868 may be taken as the commencement of a new epoch, the beginning of a great physiological and chemical awakening in regard to the use of chemicals as medicinal agents. In that year chloral hydrate was first used. Its homologue, butyl-chloral hydrate, has since been largely employed. Boric acid was but a chemical rarity previous to 1875: it is now produced in tons for medicinal use, as well as for the purpose of preserving milk and foods. Iodoform was then but little known, and now makes its presence too evidently perceived by those who hopelessly try to have its odour disguised. With regard to carbolic acid, the crusade against the septic conditions prevailing in hospitals had commenced about this year, *i. e.* 1868. The use of salicylic acid for the same purpose began in 1876. Salicin, obtained from the indigenous willow, although well known, was little used till 1876. The eucalyptus products were comparatively unknown here until about 1880. Menthol and thymol also, although known, were not used at this period. The introduction of the various forms of soft paraffin likewise comes within this period. The mydriatic alkaloids, atropine, hyoscyamine, and scopolamine, were not then defined: the useful synthetic product homatropine had not been formed, nor had the myotic alkaloid physostigmine from the Calabar bean come into use. These have rendered immense service in ophthalmic surgery. The chemical properties and therapeutic uses of jaborandi and its liquid alkaloid pilocarpine, of coca and cocaine, of strophanthus and strophanthin, of gelsemium and gelsemine, of apomorphine, caffeine, cascara, chrysarobin, emetine and cephaëline, of piperazine, saccharin, and sparteine, have all been investigated within the period named, while the synthetic alkaloid eucaine now claims to be a rival of cocaine as a local anæsthetic. These two

substances, eucaine and cocaine, are constitutionally allied, and probably others having similar properties will be formed. The now well-known synthetic coal-tar products, acetanilide, antipyrine, phenacetin, and phenocoll, are entirely new to medicine. Naphthalin, which was principally known as a nuisance in blocking our gas-pipes, has proved to be a valuable intestinal antiseptic; so also have its derivatives naphthol and betol; these as well as the preparations of guaiacol, now largely used, were all then unknown as medicinal agents. Aconitine, which was then undefined, impure, and costly, has been proved to have the constitution of acetyl-benzoyl-aconine, and can now be obtained in a pure crystalline condition at a moderate price, and pseudaconitine, from Nepaul aconite, has now been defined as having the constitution of acetyl-veratryl-pseudaconine. Of alcoholic derivatives the sulphonated products of methane—sulphonal, trional, and tetronal, together with paraldehyde and urethane, have found favour as hypnotics. As a general anæsthetic ether has to some extent replaced chloroform, which was almost solely used at that time, while for local anæsthesia the chlorides of ethyl and methyl are rapidly coming into favour.

The widespread use of antiseptics and disinfectants has already worked much-needed reform in relation to the arrest of the spread of disease. The employment of vaginal injections of corrosive sublimate after parturition has reduced the mortality from child-birth even in hospital practice to something like $1\frac{1}{4}$ in a thousand, and it is now not uncommon to hear of four thousand consecutive deliveries without a single death from septic causes. Indeed there is much to render the past quarter of a century memorable in the annals of medicine as an Art as well as a Science.

§ 3. On the minds of some, both in the profession and out of it, there is a firmly-established fear that there is something dangerous and unsafe in too much understanding of the nature of things, including the nature of disease. To such it seems much better and safer to rest contented; that it is the best thing to do certain things under certain circumstances without being too inquisitive or curious as to the how and the why: in fact they rather avoid being able to give a reason for the faith that is in them. To those who search into the nature of things

they affix the term unpractical. If research has yielded positive information, and a law has been established, they call its elucidator a theorist. A theory, no matter how well founded, has to them something dangerous about it, and indicates unsoundness in its author. "What an insult it is to the chartered imbecility of industrial mediocrity that Shakespeare, Plato, Goethe, Humboldt, Bacon, indeed any one who possesses anything of inspiration, should not be a mere sense-machine for registering observations. That some should declaim against theory is no more than that an eunuch should inveigh against lechery; it is the chastity of impotence." Such leanings have done much to retard the progress of medicine and have decidedly crippled its usefulness. The carefully-acquired knowledge of one man, however useful to himself and his patients, gave little or no additions to the general stock of information, because it remained individual knowledge derived from experience, which died with its possessor because he could not formulate it—could not so arrange it as to bring it within the sphere of the cognizance of others. He could treat one complex case admirably from his previous experience of like cases; but he could not enable another to treat such, or similar cases. The knowledge existed —but not in a communicable form. It has always appeared to us that if such experience could only be rendered available to others, a great step would be secured. Much of the advance of knowledge lies in the capacity of one generation to benefit by the experience of its predecessor, in the power to appropriate the information gathered by those who have gone before us,—knowledge which we in our time should leave elaborated and enlarged to those who shall come after us. Medicine is no exception to this rule. A man should not only learn for himself, but he should gather and garner for his successors.

The abolition of Pharmacology as an examination subject has been attended with disastrous consequences. Men leave the hospitals absolutely without any knowledge of how to prescribe. It is not with them a question of prescribing the right thing, but of being able to prescribe anything at all. Students when they are clinical clerks and dressers do not care to be told how to write prescriptions, for "they don't ask that now at the exams." When it is pointed out to them that such

knowledge is essential in practice, they argue that they can pick it up "afterwards." In most cases the "afterwards" never comes.

In carrying into execution the scheme of this work as it now presents itself, no attempt will be made to gather together all the facts of medicine, to collect all the information possible, nor indeed to enumerate all the members of the pharmacopœia. Such aim would tend to make this work encyclopædic instead of a treatise rather inciting and suggestive. Our aim, if it can but be accomplished, is to supply a digest of the general principles of therapeutics, to arrange well-known facts of practice, together with the explanations furnished by pathological research and physiological inquiry, in such array and form, that the treatment of each individual case shall become a fairly intelligent and rational procedure, rather than a groping empirical guess. Failure even may indicate to some one else a line worthy of pursuit. Especially is some such work indicated for the use of those who receive a scientific education without anything like a corresponding acquaintance with actual practice; and who pass into the ranks of the profession, and are brought face to face with the care and responsibility of grave and complex cases, without that aid and supervision from teachers or seniors to which they have hitherto been accustomed.

Practice differs essentially from the examination-table. An examiner may temper the wind to the shorn lamb, and remember that a diploma only guarantees the possession of a certain minimum of knowledge; but in practice the most complicated affections are presented to the tyro. Further too there is this difference: in the hospital the patient is merely a case of Bright's disease, or some other disease; in actual practice the patient is a personage, and the management of the case may exercise a distinct and powerful influence over the professional reputation and prospects of his medical adviser. Such a consideration alone is often sufficient to produce in the young practitioner a certain disturbance of the intellectual equilibrium, and to interfere with that serenity so desirable for calm investigation and decision; to induce in fact perturbation of a nature militating against perfect self-possession.

§ 4. It is apparent that a patient is not merely a subject of interest as the victim of some morbid process, nor even as furnishing an opportunity for individual advancement merely; he is an elaborate and interesting organism possessing certain definite qualities. In fact he is a Man. He is a Being who possesses the attributes of humanity collectively; together with some variations which form individual peculiarities. In relation to the first he is an organism which has possessed the power of growth, of evolution until a certain point is reached. After that point is attained growth ceases, and a condition of perfect functional activity is established. In time, however, the system is no longer equal to maintaining its integrity, and certain modifications of nutrition are produced, which we recognize as evidence that the system is becoming old. Such changes are often prematurely induced, and are then termed degenerations.

One thing especially strikes the observer in relation to disease, and that is the capacity of the organism to maintain its existence for several days without supplies of either food or drink. Yet the excretions are going on. It is also found that during this time of fasting there is a loss of body weight. It is evident, that the body possesses a reserve fund within itself; and that for a time it can exist solely upon this reserve fund. This possession becomes a specially valuable matter in disease. The fund takes its origin in the food we consume. After each meal so much is stored up; every day so much is withdrawn from this body bank. If each day's food had to furnish each day's supply of force, we should have a most uneven existence; and anything like a normal state would be impracticable. By this system of storage man saves up under favourable circumstances, and ekes out his daily needs under less favourable circumstances. There exists a species of capital, or physiological fund, into which he can pay, or from which he can draw according to his necessities. This store of force will keep a man alive, when deprived of food, for ten days or more. With slight daily subsidies it will maintain life for a much longer period. Thus in acute disease this reserve fund enables the system to tide over the time of trial; if this period be survived the system is left weak, enfeebled, and reduced in bulk

and weight. After the active disease is over there comes a period of convalescence, when the body capital is being restored and a new fund of force accumulated. This period is not without its dangers. The treatment of the disease by stimulants is alone rendered possible by the presence of this reserve fund. Stimulants enable the system to unlock some of its reserve stores. Alcohol is a readily oxidizable form of hydro-carbon, and as such is easily converted into force by the system. Often indeed it is the only food practically available. But it also enables the system to borrow from itself much more than it furnishes. When the person dies exhausted, the real state of matters is this—the reserve fund has been reduced below the point compatible with survival. This is death by exhaustion. This reserve fund of force exists in every individual. In some it exists in a highly-marked condition, and these persons are said to possess great "stamina." Others possess it in a less degree; they are said to have little resisting power. Systems broken by disease, or wrecked by bad habits, possess but a small reserve fund. It is a matter of vital importance in the treatment of disease to be able to estimate fairly and correctly the extent and amount of this reserve fund in each and every case.

§ 5. Then come certain other matters which gravely modify the significance of objective phenomena of a more personal or individual character, which are not to be overlooked. First among these is the diathesis. The diathesis is the form or type of constitution inherited from the parents. Five such forms are described: the strumous, the gouty, the nervous, the bilious, and the lymphatic. Each constitution carries with it certain tendencies and leanings, of the greatest possible practical importance. In each there is a distinct inclination to institute certain symptoms, and to present certain complications. The strumous are very often lacking in vital force, and are the objects of much care during convalescence from acute disease; especially if it be of a zymotic character. The gouty are very liable to ailments in advanced life, often of the most varied and even Protean character; but in each the imperfect elimination of nitrogenized waste forms the basis. In the nervous there is a distinct leaning towards complicated diseases connected with

the nervous system, requiring special care and watchfulness: in this class we find the patients for whom it is so difficult to prescribe, they are either excessively susceptible to all drugs which act upon the nervous system, or, less commonly, they require very large doses. The bilious are always more or less troubled with an accumulation of bile-products in their portal circulation, and, with them, attention to the liver is indicated in the treatment of all acute, no less than of chronic, affections. In those of a lymphatic diathesis there is always a feebleness of resisting power, and the unenergetic system requires much whipping up with stimulants, alcoholic and other, to enable it to tide over attacks of acute disease. In addition to these points of diathesis the family history is often most instructive. The long duration of life in one family often whispers hope under conditions of gloom. The history of the family will often put the practitioner upon his guard when there is nothing apparently in the case itself to arouse his apprehensions. Amongst personal characteristics too is the possession of endurance. In one system repeated attacks of disease may have shaken it to its very foundations; and the organism is already tottering, waiting for the last and perchance minute disturbance which will result in total overthrow. In another repeated perturbations seem but to have educated the system to seek a new equilibrium under disquieting circumstances, and this education enables it to recover from rude oscillations which would be utterly destructive to most systems. There is also the greatest possible difference in individual organisms as to the amount of food, wine, etc., required to compass a certain effort, or to evolve a given amount of manifested energy. Locomotives apparently identical vary much in the amount of fuel they consume in performing a certain amount of work. Horses notoriously differ in the amount of food they require; the labour executed being apparently the same. All these different factors must be included in the correct appreciation of each case, and are quite as important matters as the objective facts ascertained by stethoscope and urinometer.

In certain combinations, varying widely in different systems, these individual characteristics just enumerated are so pronounced as to form what are called idiosyncrasies. Often quite

unintelligible as to the why of them, these idiosyncrasies are most important matters in the treatment of disease. Thus one person cannot take milk; while others cannot eat an egg. Such peculiarities will always receive attention from the wary and far-seeing practitioner. Then others cannot take quinine, or can tolerate some forms of iron only. To one few tonics are endurable, while another seems only to be the worse for every conceivable form of neurotic. The intolerance of opium and mercury by certain persons is well known. It is often found combined in the same person, and especially in the subjects of chronic Bright's disease. In fact such intolerance should always furnish a strong hint to investigate the condition of the kidneys. Chloral hydrate, hyoscyamus, and other neurotics are well or ill borne by different individuals in a curious and almost inexplicable manner. In an aged couple recently under observation, both of whom were subject to attacks of suppressed gout, chloral was simply a poison to the lady, while her husband's praise of it amounted to eulogy.

§ 6. There are other points, associated with individual characteristics, of much importance in practical medicine, directing the prognosis and guiding the line of treatment. One is the general deterioration of physique, not always giving outward visible indications, which is found in persons who have undergone much privation, or who have lived under unfavourable circumstances for some space of time. Bad or insufficient food, impure and tainted water, and foul, polluted air, singly, but more potently when combined, in time produce a deterioration which readily reveals itself in the course of epidemics. The different areas of individual water companies have been found to give widely-varying results in the proportion of deaths occurring during epidemics. The high death-rate clings to the impure water-supply. Persons thus influenced, or unfortunately so placed, sink under disease much more speedily than others who live under more favourable circumstances. They possess little resistive force, and what they have is quickly exhausted by serious disease. In such persons it is necessary to commence a plan of stimulation combined with nutritive food, in anticipation of the hour

of trial. If this treatment be delayed till the indications present themselves, it will usually be found inoperative and unsuccessful; it has been too long deferred. In such cases the medical man must learn to see his evils far ahead and prepare to meet them.

On the other hand there is a large class of people not quite coming under the head of invalids, and yet not perfectly healthy, for whom a directly opposite line of treatment is indicated. They are persons who have established an ideal of health to aim at—quite irrespective of their capacities. They do not possess a normal amount of health and strength, or age is commencing to lay upon them its enervating hand, yet they are loath to acknowledge either. They aspire to the habits and practices of perfect health, or of a by-past time, and bend all their energies to the attainment of these aspirations. Instead of reducing their self-imposed demands to the capacities of their system, they endeavour to whip themselves up to their ideal by large supplies of stimulating food and liberal draughts of alcohol. It is of no avail, however; and then a complete breakdown, followed by protracted convalescence, is the result achieved. If they can be prevailed upon by any means to moderate their aspirations, or be compelled to limit their demands upon themselves to their capacities, much better health, and even length of days, would be practicable. They form a large and important class of chronic patients; with whose peculiarities and individual necessities the prudent practitioner will do well to make himself familiar. There is another class of persons who are chronic invalids of a different description, with whom more acquaintance on the part of the profession is desirable. They usually occur in the more affluent classes; indeed, their existence is scarcely compatible with hardship and penury. They have not yet found a biographer in the ranks of medicine: and the best sketch of such a person is the brief one by George Eliot in *Adam Bede*, where she describes Miss Anne Irwine, the Rector's invalid sister. A poor wretched spinster, with a small wan face, worn and sallow; with chronic headaches, necessitating rest in bed with a darkened room; the prey of neuralgia and depression; utterly unacquainted with the sensations of

buoyant health and possessing but a minimum of energy; bare existence under the most favourable circumstances is all to which such a system is equal. Great and tender consideration, a low voice whose tones vibrate with sympathy, and a noiseless step, are more desirable here than extensive acquaintance with remedial measures. Such cases do not furnish brilliant cures, as do the hysterical; but they furnish grateful, attached patients, susceptible and thankful for your consideration. It is the height of cruelty to demand manifestations of energy from such poor creatures,—they are simply not equal to them.

§ 7. Then again there is still another and larger class of patients—the chronic invalid, suffering from some incurable malady. It may be chronic gastritis, cirrhosis of the liver, a tuberculous lung, a weak heart, or granular kidneys which constitute the weak spot of the otherwise fairly healthy organism. If the injured or defective organ could but be restored to its pristine integrity, a return to something like perfect health would be feasible. But such restoration is simply impossible. Health consists of a balance between the various parts of the organism in power as well as in function. If the disease in one part is incurable, the sooner a new balance is struck the better. A general lowering, or levelling down is alone calculated to preserve the organism in such cases; and attempts to improve the general condition too far by any process of levelling up is but too commonly followed by disastrous results. An improvement in the general condition is not rarely productive of a still further disturbance of balance between the weak part and the rest of the body; and then usually a new accession of disease in the injured part fellows as a consequence. For instance, if the kidneys are injured, a comparatively high state of general health with good assimilation and much nitrogenized waste, is not uncommonly the cause of an attack of suppressed gout, may be as bronchitis or even pneumonia, the consequence of renal inadequacy; or an attack of acute nephritis may imperil the existence of the individual—which attack might have been avoided if the general condition had not differed so remarkably from the condition of the kidneys. Or, again, a person has a weak heart or an aneurism. Here the condition of chronic invalidism is more consonant with the continuation

of existence than is that of a capacity for exertion, which would test too severely these injured structures. It is a great point in practice to distinguish clearly when to cease our efforts to improve the injured part by measures directed towards the general condition, and when to inaugurate a line of treatment which shall bring the condition nearer to that of the incurable organ. Constantly in practice such modification of our therapeutic measures will be indicated.

Such are several of the most important variations from the normal which present themselves in daily practice. They present problems not always easy of solution. Sometimes we are scarcely thanked for their solution: at other times they furnish us much credit. They all need careful recognition, and give much valuable material for the elaboration of a line of treatment. Practically the clear appreciation of these rational indications often outweighs the information afforded by instruments of diagnostic precision.

Frequently the information thus afforded will put the practitioner on his guard in seemingly trivial cases, and prompt him to leave no stone unturned in cases where the physical signs are far from alarming; at other times it will whisper hope and encouragement where all seems dark and untoward; in either case it will exercise a most pronounced effect upon the line of treatment. In order that our therapeutics may be successful, a distinct recognition of the case in its entirety, in its subjective as well as its objective phenomena, is most necessary; and a thorough appreciation of what is to be dealt with must, or ought, to precede our measures for dealing with it, otherwise much valuable time may be lost, or opportunities have passed away—never to return; and an unavailing regret be left where a more guarded attitude at first might have changed the whole aspect. The view presented to the medical man after his examination of the case should be such that it will include the past history of the case; nay, more than that, it should embrace the family history on both sides, and should also furnish useful forecasts as to the probable future. This is a genuine diagnosis, and is as widely different from the mere physical diagnosis—now so fashionable—no matter how exact, as is a fertilized from an unfertilized ovum; the one is, too

often, a mere series of barren facts, the other is pregnant with potential hypotheses.

§ 8. Having decided upon the ailment and formed a careful diagnosis, having satisfied the patient's friends as to the prognosis —it is perhaps not always desirable to tell the patient what is the matter or the gravity of the position, but never leave the friends in ignorance—the practitioner must proceed to construct his plan of treatment. It is a golden rule never to prescribe in an off-hand slipshod manner; whoever does so will sooner or later trip. It is well always to construct, as far as possible, a distinct scheme and a definite plan of treatment. No matter how slight or trivial the case, it is desirable always to act on an intelligible and intelligent plan. Always, as far as practicable, we should prescribe with knowledge as to what we expect our remedies to do. It is certainly fortunate that the agents are not influenced in their action by any theories or hypotheses on which they are administered. If such were the case our therapeutics would indeed be chaos. Nevertheless it is always agreeable to give medicines with a lively expectation as to what they will do. Such prescribing always gives a greater sense of satisfaction than when one is driven to prescribe *secundem artem*, or according to an unilluminated empiricism. Often indeed it is necessary to sketch out a scheme which will not only include the immediate present, but which will map out a line stretching far into the future. It may be desirable to give, at first, sedative or diaphoretic remedies; to be followed in a day or two by tonics, or possibly by extract of malt, or cod-liver oil. Or a case of suppressed gout may require eliminant measures with alteratives and a restricted diet for a time; after which tonics, good food, and wine are desirable. These arrangements are not contradictory, nor even inconsistent: each has its turn of usefulness, and then gives way to another. Such alternations do not indicate changes of opinion or caprice: they demonstrate a clear-sighted view of the case. As wheat is sown, grows, and ripens ere it is cut; so complex plans of treatment have their several stages. For instance, in an acute catarrh it is well to give small and frequently repeated doses of tincture of aconite to begin with; and then when the skin has been roused into free action, to administer stimulating expectorants such as

the carbonate and chloride of ammonium. What we aim at is first to throw the skin into action and lower the temperature, measures which relieve both the catarrh and the pyrexia; and then to give well-chosen tonics, and especially tonic expectorants.

Whatever line or plan the reader may adopt it should be rational above all things: if there is really nothing else for it, let it be selected by or from a well-chosen empiricism, either personal or acquired. How to meet the bulk of cases encountered in practice will be described in the course of this work. It is a matter of the greatest moment in grave and complex disease that the practitioner should keep his head clear and his judgment sound. If he loses his head it is as disastrous to the case, as it is to an army when the general loses his presence of mind in a battle or a strategic movement. And nothing can or will keep a man's head clear so effectually as the consciousness that he knows his work.

It is no part of the present scheme to provide a complete treatise on Pharmacology and Therapeutics. There are such works, some of great excellence, which can be profitably consulted. The attempt here is rather in the direction of enabling the reader to wield satisfactorily a great proportion of our remedial agents, and to guide him in his therapeutic evolution; teaching him how to educate himself, and how to apply remedial agents intelligently and successfully. Some learn quickly for themselves how to combine remedies, how to construct prescriptions exquisitely adapted to the case before them; but others are not so fortunate, and for them the combinations given in a concrete form throughout these pages may be useful. The aim of this work is the suggestive rather than comprehensive. As Dr. Latham says, there is no greater impediment to knowledge than over-teaching. The teaching which is most required is the purely suggestive. Students and practitioners have the realities themselves to learn from, the original book to read, upon which all sound instruction is but a commentary. The commentator should only interpose when and where he is needed, and not after the manner of certain critics who most help us with their annotations where the sense of the author is clear beyond dispute. There is an old story of a country parson who made one of his flock a present of Bunyan's

Pilgrim's Progress, and anxious that he should both read it and profit by it, took care that the copy which he gave him should be well furnished with notes. Meeting the man some time afterwards, he asked him how he liked the book and whether he was sure that he understood it, and received for answer that he both liked it and understood it all well enough *except the explanations.*

§ 9. Our remedial agents form themselves into a number of classes. Several members of different classes may often be advantageously combined in one prescription. Then there are different remedial measures. They may be also united with good effect at the same time. We may briefly construct a typical prescription, and then may review combinations of different measures. Medicinal agents as a rule act chiefly on one system, or perhaps one excretory organ. These latter agents have been supposed to possess this property by virtue of some stimulating effect upon that organ especially. For instance, urea is a true diuretic, acting powerfully upon the kidney when administered internally. Aloes and aloïn act upon the lower bowel if applied to a blistered surface just as well as when given by the mouth. It is not quite certain how far some of these agents act simply by increasing the blood-supply to the different organs, and so increasing their functional activity—for these two stand in strict relation to each other—or how far they stimulate them into action during the process of elimination. It may be desirable to give together two agents possessing different actions, say as sulphate of magnesium and sulphate of iron, in, for example, a case of anæmia with constipation. These are the chief factors of the prescription. It is necessary however to give them in a vehicle which may itself possess some value. It does not follow that they need be given merely in water. There may be a certain loss of appetite which may indicate some bitter infusion, as quassia, as the best vehicle. Then it not unfrequently happens that such a dose is not very perfectly borne by the stomach; it seems to be cold, or to be followed by a sense of nausea, or eructations of wind. Under these circumstances a few drops of tincture of capsicum will form a capital addition. This is termed an adjuvant. The prescription will stand ultimately in the following form:—

℞ Magnesiæ Sulph. gr. xx.
Ferri Sulph. gr. v.
Sp. Chloroformi, ♏xv.
Tinct. Capsici, ♏iv.
Inf. Quassiæ, ad ℥j.

This may be taken two or three times a day, from ten to fifteen minutes before food; either before breakfast and dinner, or before dinner and supper, or before all three. Medicines are apt to be somewhat nauseous; and the above forms a bitter and warm chalybeate. Something is evidently desirable to take away the taste. A draught of water accomplishes this best. Such draught not only removes the taste, but it often acts usefully,—is indeed of material value. Especially is this the case with chalybeate and alkaline medicines. It is often remarked that natural waters of these two classes effect good results when similar remedial agents given medicinally have distinctly failed; and that, too, after long and persevering trial. The amount of water makes the difference. Alkalies and iron when administered in small doses should be taken before food, and be washed down by copious draughts of water; and it will not often be necessary to send patients to spas for natural waters to achieve what home-treatment has failed to accomplish, if this rule were generally attended to. This is an important practical wrinkle.

It may happen however that it is found convenient to modify the prescription. For instance, it may not be easy to hit upon the exact amount of purgative the patient requires in order to keep the bowels gently open. It is one of the most disturbing matters possible in prescribing to adjust the exact amount of a purgative. So commonly is this fact recognized that it is usual to ask a patient whether he, or she, is easily purged or not. This is a question that in many cases it is undesirable to omit. Instead of sulphate of magnesium in the mixture, a pill of aloes and myrrh at bed-time, every night or second night, may be desirable. A slight action on the bowels is almost always beneficial at the commencement of a course of iron; but it had better be within bounds, else it may be harmful, or it may disgust the patient. Sometimes, too, quinine is indicated as a

tonic in addition to the iron as a hæmatic and tonic. The following prescription might be used:—

℞ Quininæ Sulph. gr. i.
Acidi Hydrochlor. Dil. ♏iij.
Tinct. Ferri Perchlor. ♏v.
Tinct. Capsici, ♏iv.
Inf. Quassiæ, ad ℥j.

with

Pil. Aloes et Myrrh, gr. v. p. r. n.

at bed-time. There is nothing contradictory in such a combination. Even more complex arrangements are sometimes needed. As, for instance, supposing the patient has piles, it would then be necessary to resort to another remedial measure:—

Ungent. Gallæ Co.

A small quantity to be applied on the tip of the finger to the piles after each motion of the bowels: taking care to bathe them well, or rather wash them thoroughly with cold water immediately after the bowels have moved. If it happens that the patient is a female, it is more than probable that under these circumstances she will have leucorrhœa too, and then something more will have to be added, viz. another measure also of an astringent class:—

Aluminis Sulph. ℥ ij.
Aquæ, ℥xvi.

to form an injection to be used twice a day, with the patient in the recumbent position.

§ 10. Such would form in most cases a comprehensive line of treatment; and though looking at first sight a complicated affair, is nevertheless clearly intelligible and consistent. Another therapeutic measure even might be indicated if there also existed, as there very possibly would, a certain amount of palpitation. In that case it might be well to add an external application to the skin,

Emp. Belladonnæ, 6 × 4 in^{s}.

to be applied over the region of the heart. The patient by this time would be pretty effectually drugged, and it would scarcely

be quite prudent to start with all this at once. It might, however, all be necessary if the patient had long been ill, and nothing but a thoroughly effective and comprehensive therapeutic plan would be of any avail. If the piles caused much distress and prevented sleep, it might be necessary to add one more therapeutic measure, often very serviceable—

Morph. Hydrochlor. gr. ¼
Acidi Gallici, gr. ij.
Lanoline Ointment, ad ℥ ii.

to be inserted nightly within the anal ring; placing it upon the tip of the long finger of the right hand, in order to pass it easily through the sphincter.

§ 11. This would in its entirety form a fairly exhaustive treatment, carrying with it the elements of probable success. But it might not be wise to cease even here. It might be necessary to prescribe various forms of massage to be administered at stated intervals. It is true that this mode of treatment has of late fallen into undesirable hands and into disrepute, but for all that it is a therapeutic agent of much power when administered with propriety and decency. Then it might be necessary to recommend a cold bath every morning; or if this were considered too severe, a tepid bath. Also it may be desirable to advise long hours of rest in a well-ventilated bedroom; with early hours to bed, and late ones at which to rise. A protest might be raised at this by some well-meaning friend, who has a sort of impression in his or her mind that long hours in bed are wicked. Such a notion has retarded the recovery of many a patient. If it were only necessary to count beads during waking moments, such plan of short hours of sleep might be free from mischief; but with something more to do, long hours of sleep are often imperatively necessary to ensure a sense of energy when awake. They are still more necessary in the restoration of a state of health. The safest rule is to permit patients to sleep wherever, and whenever, and as long as they please and can, until they no longer feel sleepy. It is even desirable that the patient lie down and sleep, if possible, for a couple of hours after the mid-day meal; especially is this desirable if the patient be at a spa or watering-place, where all rise at an early hour.

This sleep breaks the long day in two, and the evening is enjoyed. Such rest does not, except in a few cases, interfere with the night's rest; in many cases the night's sleep is all the sounder for the afternoon nap. If the practitioner have the time, and the patient craves attention, he might substitute for the suppository mentioned above a hypodermic injection of a solution of morphine. This is an efficient means of procuring sleep. But it is one which must be resorted to with very great care, for the morphine habit like the cocaine habit is one which is soon established.

It is further requisite to direct the diet. This should be at once nutritive and digestible. It is commonly most convenient to have a large portion of it in a fluid form. Milk, to which more or less of an alkali has been added, eggs lightly cooked, meat-juice, sago, arrowroot, or corn-flour or lentil-flour puddings, custards, blanc-mange, &c., would form the chief dietetic material. Beef-tea peptonized with zymine powders is a useful addition to the list, and other forms of predigested foods are readily prepared. To this might be added, according to circumstances, some generous wine—sherry, burgundy, champagne, moselle, or even port. Or a little brandy-and-water or whisky-and-seltzer some would prefer; whilst others are the better for some sound malt liquor in good condition, as pale ale, stout, &c., in bottle and "well up."

§ 12. The orders given will very much depend upon the social position and the means of the patients, as well as upon the ailments. There is nothing more cruel than to order patients what they or their friends cannot procure. It matters little whether it arise from thoughtlessness or cruel indifference, it is equally heartless and useless to order patients what it is impossible for them to obtain.

§ 13. Having calculated then as far as is possible—and in the great majority of cases in general practice it is quite feasible to do this—the means of the patient as well as his needs, it behoves the practitioner to lay down his line of treatment; bearing in mind the condition of his patient, and the action of the remedies about to be prescribed. There is a something to be learned by experience in prescribing, which tells when one preparation of let us say iron will succeed after another has

failed, which it is impossible to transfer from one person to another. Careful perusal of the following chapters will, it is hoped, do much to enable the reader to acquire this and other similar information; but this he must do for himself, for no deputy, however willing and enthusiastic, can perform this labour for him. Education is not mere information; and it is not so much any mass of mere information which gives this work any value it may be found to possess; but rather that there is such a selection made as will best illustrate principles, and enable the reader to peruse, with more profit and advantage to himself, the systematic treatises on Pharmacology and Therapeutics whose place this work does not aspire to usurp.

CHAPTER II

ASSIMILATION

§ 14. The first subject which calls for our attention is that of assimilation, or the means by which what is taken in as food is converted into the material by which the system is sustained. The different morbid changes which interfere with assimilation necessitate careful attention to the physiology of this process, in order that we may have an intelligent comprehension not only of the changes themselves, but of the *rationale* of our therapeutic measures. We shall find that the subject, though difficult, is not by any means so insuperable as many suppose. The application of clear common sense and the determination to understand the subject will enable most men to surmount the difficulties. The following sketch of the physiology of digestion and assimilation is not intended for teachers of that subject, but is a broad outline for readers whose physiology may not be very clear, or may have grown rusty in practice.

All force, all manifested energy, is derived from our food. This food is chiefly that form which supplies our animal heat, viz. the hydro-carbonaceous. It is furnished to us as the carbo-hydrates, starch, sugar, and gum, and the hydro-carbons, fat, oil, and butter, the union of these with oxygen, or their combustion generating the force which is rendered apparent in locomotion or manual labours. Such food however will not support life for long if altogether dissevered from nitrogenized materials. These nitrogenized principles are requisite for the formation of tissues, and for the evolution of force. Without nitrogen the force stored up in the body could not be unlocked or manifested. The leopard cannot run a race with the

antelope, but it can catch the deer by a sudden rush; because its blood is highly charged with nitrogen-compounds, and it can generate rapid if but briefly sustained motion. The antelope can go much further, but it cannot escape the rush, because it cannot discharge its force fast enough. But hydro-carbons are also essential to the formation of healthy tissue; while nitrogenized materials evolve some force in their oxidation. Sufficient supplies of each are requisite in order to repair daily wear and tear, and to give out force. The hydro-carbons are the fuel convertible into force in the body as much as coal in the locomotive's tender is the driving-power in a static form. The oxidation of the one drags the train from terminus to terminus; the oxidation of the other gives us all, or nearly all, our body-force, intellectual or physical. Various salts, containing lime, chiefly in the form of phosphates, potash, soda, and iron, are also required to keep the body in health. We will now briefly trace the course of food.

§ 15. Food may be solid or liquid. If the latter, the digestive process is somewhat simpler, and mastication is not required. If solid, food is rolled over with the tongue, ground with the teeth, and thoroughly mixed with saliva, in the mouth. Here the first change is undergone, namely, the conversion of some of the starch into sugar by the diastase of the saliva. The saliva secreted in the mouth is a mixture of three large glands on each side and of numerous small ones. The large glands are the parotid which opens by a duct called Stenson's, opposite the second molar tooth of the upper jaw, the submaxillary which opens by Wharton's duct under the tongue, and the sublingual which opens by a number of ducts close to and into Wharton's. The smaller glands are scattered profusely all over the mouth and the surface of the tongue. During the process of mastication a certain amount of oxygen is worked in along with the salivary secretion, which makes digestion easier and more perfect. Then the mass is swallowed. In the stomach it is turned over and over, and the nitrogenized matters are gradually dissolved by the action of the gastric juice. This juice is an acid secretion, formed in the epithelial cells of the gastric tubules. It contains two ferments: pepsin which changes proteids into peptones, and rennin which curdles

milk. The acidity of the gastric juice is due to the presence of free hydrochloric acid, the proportion of which in man is about one-fifth per cent. Pepsin is capable of digesting meat out of the body if in the presence of warmth and an acid fluid. In the stomach nitrogenized material is converted into *peptones*, in which form it is absorbed into the blood. Unlike other forms of albumin, peptone is very diffusible. It diffuses with remarkable facility through animal membranes. During the digestive process the pyloric ring is pretty fairly contracted, and only permits of the passage of digested material until the termination of the digestive act, when it relaxes, and the undigested materials pass along the intestines towards the anal orifice. After passing the pyloric ring the fat we consume is brought under its own special digestive process. It is brought in contact with the pancreatic juice and with the intestinal juice, or *succus entericus*. The pancreatic juice contains four ferments:—(1) Trypsin, a proteid digesting ferment; (2) amylopsin, an amylolytic ferment; (3) a fat-splitting or lipolytic ferment; and (4) a milk-curdling ferment. The *succus entericus* contains a ferment called invertin, which converts cane sugar into a mixture of dextrose and levulose. All these ferments have their own special function to perform, and act on the different constituents of the food which have escaped the action of the gastric juice. The chief action of the bile in the process of digestion is the emulsification of fats, a process which it accomplishes in co-partnership with the pancreatic juice. In the intestines the different products of digestion are absorbed, either by the lacteals of the intestinal villi and so borne into the receptaculum chyli, or by the venules of the portal circulation. The blood of the portal circulation contains during digestion a relatively large amount of albumin, of sugar, and of water. After long abstinence it does not differ from that of the venous system in general. A large quantity of bile is also poured into the chyme, as the digested food is termed. This bile is however usually reabsorbed, and but little bile is normally found in the lower intestine. Fæces consist of the solid and indigestible constituents of food, chiefly, that is, with certain salts, mostly phosphates, and certain excretions from the glands of the intestines.

In connection with digestion must be included a consideration of the other functions of the liver. The liver is a most important viscus, but the general impressions as to it and its function are very vague, and even erroneous. The prevalent idea is that it excretes bile, as a noxious product of digestion; and that biliousness indicates a sluggish liver. This view is essentially erroneous. The ultimate source of sugar and of every other constituent of the body is the food we eat; and this, as we see in a typical meal of beefsteak, bread, and pudding, consists of fat, albumin, starch, and cane sugar. The fat takes no part in the production of sugar within the organism, but the other three do. After they have entered the intestinal canal the starch is converted into grape sugar by the saliva and pancreatic juice, and the cane sugar into a mixture of glucose and levulose, by the intestinal juice. The albumin is converted into peptone by the gastric and pancreatic juices. The sugar and peptones thus formed by the intestinal canal are absorbed by the intestinal veins; but they are not all at once poured into the general circulation and carried to the brain and muscles. If this were the case, these structures would get all their nutriment at once, and they would have to stow it away themselves for use during the intervals of fasting. The liver acts as a storehouse in which the superfluous nutriment absorbed during digestion is laid up, and gradually given out again into the blood during fasting. The sugar which has been absorbed from the intestines is conveyed by the portal vein into the liver; and there it is converted into glycogen, and stored up in the hepatic cells. If the portal vein be ligatured so that the blood finds its way from the intestines to the heart and body by means of the collateral circulation, without passing through the liver, glycosuria occurs. The first great function of the liver, then, is to form glycogen from the sugar and peptones supplied to it from the intestines, and to store them up till wanted. The second great function of the liver is to give out, during fasting, the nutriment which it has stored up during digestion. This is effected by the glycogen, which has been stored up in the organ, becoming gradually transformed into sugar again. It is then washed out of the liver by the blood, and carried with it into the general circulation. The bile

thrown into the intestines is, to a large extent, superfluous matter. It probably, however, serves some useful purpose in digestion. Normally, it is chiefly reabsorbed. In excess in the bowels it produces diarrhœa. When its outflow is checked we have constipation, as in jaundice.

This function of the liver must be remembered in the treatment of various forms of ailments. Mercurial purgatives do not increase the bile-secreting power of the liver, but they sweep out the bile products in the intestines and portal circulation in excess. Thus they produce bilious stools, and give relief to that condition known as biliousness. It is important to bear this in mind. It clears up a difficult subject, often obscured by so-called explanations.

Allchin, in his Bradshaw Lecture on *The Nature and Causes of Duodenal Indigestion*, points out that as a digestive agent—*i. e.* as a solvent fluid—the bile is of little account, since it is very doubtful whether it exerts any effect by itself upon the proteids or carbo-hydrates, and as an emulsionizer of fats it is far inferior to the pancreatic juice, to which it appears to be distinctly accessory in its digestive action. But whilst occupying this secondary position as regards the conversion of the ingesta to a diffusible state, it has a very special value in two other directions, one of which especially concerns us here. First, it undoubtedly facilitates the *absorption* of fats, rendering the mucous surface more permeable; and secondly, it exerts a very definite action upon the chyme, which appears to be a desirable preliminary to the pancreatic digestion. The proteids of the chyme, as already said, consist of those which have escaped peptic digestion, together with peptones and intermediate bodies known as acid albumen and albumoses. The peptones, which are both soluble and diffusible, are untouched, but the undigested proteids in solution and the acid albumens and albumoses, as well as the pepsin, are precipitated in a flocculent and granular form by the alkalies and salts of the bile. The exact object of this is not very apparent, but it is upon these substances that the trypsin ferment of the pancreatic juice exerts its action, with the result of converting them into diffusible peptones, similar if not identical with the products of peptic digestion, and through similar intermediary stages. The pancreatic digestion of

proteids is, however, carried further in the disintegration of the molecules than the gastric digestion is, since the hemi-peptones of tryptic fermentation may be converted into leucin and tyrosin, preliminary stages to the excretion of the nitrogenous excess as urea. How far this actually takes place in the intestine probably depends in great part upon the amount of proteids present. The conversion of the undigested starches of the chyme by the amylotic ferment of the pancreatic juice is exactly comparable to the action of the ptyalin of the saliva, perhaps aided therein by the bile, and the fats are chiefly emulsionized, and to a slight degree saponified. The salts and other diffusible elements of the chyme are absorbed from the intestine without further treatment.

§ 16. After this brief sketch of assimilation, we may now profitably consider the different disturbances which mar or interfere with these various processes. Firstly comes the question of the changes undergone in the mouth. Very little can be done by drugs here, so we may dismiss them at once. But it does not necessarily follow that therefore nothing can be done. Much indigestion, and consequent imperfect assimilation, takes its origin in decayed teeth. In consequence of the condition of the teeth the food is not well masticated. Not only that, but as a result of the loss of power to masticate, the food is swallowed without being fairly saturated with saliva. It is thus doubly unfit for reception by the stomach. When such a condition obtains, the dentist may be of much service. So far as the medical practitioner is concerned, he can see that a suitable denture is supplied, and can advise a suitable dietary. The food ought to undergo such culinary preparation as will, to a great extent, do away with the necessity for mastication. Light puddings, soups, minced collops, sausage meat, various entrées, preparations of eggs and milk, furnish a not unvaried, or unpalatable dietary for the toothless. It must be impressed upon them that the rolling of the meat about by the tongue, and the mixing of it with saliva are important matters; and the hard gums often form no very imperfect substitutes for the missing teeth. If the craving for slices from the joint be very strong, it may be indulged with a minimum of bad result by the skilful and industrious use of the knife ere the meat is conveyed to the mouth.

Sialagogues.—All sapid and acrid tasting materials cause the mouth to water by the flow of saliva so occasioned. The smell of cooking usually produces a similar result, if we are hungry. If we are sated with food, the same smell causes nausea. The tasty materials which are sometimes consumed at the commencement of a long dinner, caviare for example, probably act to some extent as sialagogues. The presence of food in the stomach causes a flow of saliva, as Dr. Gairdner found in a case of cut throat. Here the injection of broth into the stomach caused a distinct flow of saliva. The importance of the addition of saliva to food is shown by the experiments of Spallanzani and Réamur, who found that perforated tubes containing food placed in the stomachs of animals gave the following results. Food moistened with saliva was most quickly digested; then food moistened with water; and lastly, food not moistened at all. The best example of a sialagogue is pilocarpine, one of the active principles of jaborandi, but this is never employed for the production of a purely local effect. Mercury is a sialagogue, but the excessive flow of saliva serves no useful purpose. Neither is pellitory ever used to increase the flow of saliva for admixture with food.

Instead of acting upon the salivary glands it is more convenient in practice to give starch which is to a large extent predigested, either by exposure to heat or by the matting process. Such predigested starch is almost independent of the saliva. Some account of these prepared foods will be given later on.

§ 17. When the food is passed into the stomach a change in the condition of that viscus is at once instituted. Ere the food is taken, the mucous lining of the stomach is pale, only slightly moist, and possessed of an alkaline reaction. On food being placed within the stomach, the gastric blood-vessels dilate, the colour of the lining membrane changes into a rosy hue, and the gastric juice, freely secreted by the gastric follicles, is poured out on the surface, which becomes bedewed with the secretion. At the same time there is a change in the muscular walls. No longer quiescent, they commence to contract and dilate in such a manner as to produce a rotation of the contents of the stomach *en masse*. By this means the whole contents are

brought in contact with the digestive fluid, and are reduced to pulp. Such is the action of the stomach in perfect normal digestion.

There is, however, no more common disturbance than imperfect digestion. It is by no means easy to frame a definition at once concise and accurate which will include all forms of this protean malady. We know little or nothing of its morbid anatomy; it is absurd to speak of it as an affection of the stomach, for in many cases all parts of the alimentary canal, and even of the secreting glands connected with it, are affected. In what was called "nervous dyspepsia" the disturbance of function is not in the abdominal viscera, but in the higher nerve centres. For practical purposes, however, two great classes of dyspepsias may be recognized, one in which there is a deficient secretion of gastric juice, amounting sometimes almost to suppression, and another in which there is an excess of acid in the stomach, due either to hypersecretion or to fermentation of the food constituents, and the consequent formation of lactic, butyric, and acetic acids. There is another and a rarer form in which the food is retained but a short time in the stomach, and is then passed through the pyloric orifice into the intestines, where it excites peristaltic action and gives rise to a copious evacuation immediately following each meal.

Practically dyspepsia takes its origin in either an imperfect amount of gastric juice, or in an inferior form of juice of impaired solvent properties. It is and must be a difficult matter to settle, which of these pathological states of the gastric secretion obtains. Two plans of treatment suggest themselves: either to increase the amount, or to improve the character, of the gastric juice.

We will take the latter first. The knowledge that the stomachs of animals digest food of various kinds just as perfectly as do our own, has suggested the use of the digestive fluid of animals. The most suitable animal is the omnivorous pig. When properly prepared, pepsin is a very active agent. It can either be used fresh, or in the dried form of powder. It is given in doses of from five to fifteen grains usually, with a certain amount of dilute muriatic acid (5 to 10 drops), or it may be given on bread-and-butter. It is, however, of no use

prescribing pepsin without indicating specifically what particular kind of pepsin is indicated. The standard of the British Pharmacopœia is so low that almost any pepsin will answer its requirements. There are a great number of different pepsins in the market, and they differ enormously in activity. A grain of the best pepsin will dissolve 882 grains of white of egg in four hours at a temperature of 40° C., whilst a bad pepsin will dissolve only 162 grains in the same time and under the same circumstances. A medical man who is in the habit of prescribing pepsin should test the preparation he employs, or if he has not the leisure for performing this simple process should insist on a definite statement from the manufacturer as to what under certain conditions it is capable of accomplishing. To prescribe pepsin without any indication of what is to be supplied is simply playing with the subject. The term "pepsin" without any more accurate definition simply means nothing. Liquid preparations of pepsin are as a rule of comparatively little value.

§ 18. If we do not feel assured of the utility of pepsin in all cases there exists no doubt about our capacity to increase the flow of gastric juice, and so to render digestion more perfect. The various pathological conditions of the stomach will be considered in their fitting place, at present we are concerned with assimilation only, and the changes in the stomach in digestion. In fact we are here considering imperfect digestion, regardless of its causes, only in so far as the digestive act is imperfect. As said before, the functional activity of an organ is in direct relation to its blood-supply. An increase in the blood-supply gives greater functional power: a diminution in the supply of arterial blood lessens the functional power. Many agents increase the vascularity of the stomach, and so improve digestion. These are called stomachics.

Stomachics.—This is rather an old-fashioned appellation, but it will serve our turn well nevertheless. The list contains agents otherwise possessing widely different properties. Thus alcohol, arsenic, mustard, pepper, the Hungarian "paprika," capsicum, and others find themselves together. They all possess this property in common—they increase the vascularity of the stomach, in small doses; in large ones they act like irritant

poisons, and produce gastritis or inflammation of the mucous membrane of the stomach. They are all apt to produce vomiting in excess; and certainly their continuous administration in liberal quantities produces an irritable condition of the stomach.

Ere proceeding we will glance at the arrangements of the nervous supply of the stomach. It contains fibres of the sympathetic nervous system, and terminal branches of the pneumogastric. Speaking broadly, fibres of the sympathetic produce contraction of involuntary muscular fibre: cerebro-spinal fibres produce dilatation. Thus the brothers Weber found the vagus to inhibit the action of the cardiac ganglia, and irritation of it delayed the ventricular contractions. Bernard found by various experiments that galvanism of the pneumogastric excites a flow of gastric juice; while similar irritation of the sympathetic arrests the secretion. Section of the pneumogastric nerves stops digestion, and the mucous membrane of the stomach, previously turgid, becomes pale and exsanguine after such section. Thus we see the pneumogastric fibres dilate the blood-vessels, the sympathetic fibres contract them. From this we can understand how any great emotion acting on the sympathetic may at once produce indigestion. Whether our stomachics act by stimulating the pneumogastric fibres, or by paralyzing the sympathetic, we do not know; there is no doubt, however, that they increase the vascularity of the stomach. In practice we find that in many persons a small quantity of alcohol improves digestion; and that by its means a meal can be digested which would otherwise be undigested, and so wasted. But it must be borne in mind that alcohol and artificial pepsin do not agree, and therefore should not be given together. Arsenic produces a vascular flow in the stomach, often very useful. In large doses it produces irritability and inflammation. It is a difference of degree. Like alcohol, a small dose increases the vascularity of the mucous lining of the stomach and a free flow of gastric juice; a poisonous dose produces inflammation and total arrest of the flow. Ipecacuanha produces a vascular flow in small doses; in larger doses vomiting results. Ipecacuanha formed part of the best old dinner pill, which ran something like this:—

Pulv. Ipecacuan. gr. i.
Ext. Cinchon. gr. i.
Pil. Aloes et Myrrh, gr. ij.

and as such was very useful. This pill is not so much in vogue now; but its turn may come again.

It is as well to bear in mind in connection with the subject that alkalies increase acid secretions and diminish alkaline secretions. Alkalies applied to the orifices of glands with acid secretions increase their secreting power; while alkalies applied in a corresponding way to glands with alkaline secretions lessen or check this secretion. Given, then, almost immediately before food, the following prescription contains promise:—

Pot. Bicarb. gr. v.
Liq. Arsenicalis, ℥ij.
Inf. Gent. Co. ad ℥i.

It should be given a quarter of an hour before breakfast and dinner.

Next to the question of stomachics comes the question of vegetable bitters, commonly known as stomachic tonics. It is not as general tonics they are described at present, but simply in their relation to the stomach and to digestion.

Bitters.—Unfortunately it is not possible to give such a clear physiological explanation of the action of vegetable bitters as it is in the case of stomachics. There is, however, no better established fact in medicine than the action of vegetable bitters to increase the appetite and improve the digestion. They are in one form or other the resort of all dyspeptics, and the mainstay of herbalists. Marvellous and poetical discourses have been written as to the action and effects of these bitters, and their beneficial action has been chronicled by dyspeptics. As yet physiology has little or nothing to say. The facts are not to be disputed, but no explanatory voice is yet audible. There are various forms of these bitters; some simply bitter, others highly aromatic and partly astringent, from the presence of tannin. Quassia is the simplest bitter. Powerful, intensely bitter, and free from tannin, it forms the vehicle when iron is indicated. It is also the chosen agent in the dyspepsia of

drunkards. It is usually given with some acids, hydrochloric or nitric usually:—

℞ Acid. Hydrochlor. Dil. ♏x.
Inf. Quassiæ, ad ℥i.

with or without a few drops of tincture of capsicum, is a capital appetizer to the stomach saturated with alcohol. Gentian is agreeable, and forms an excellent vehicle for quinine, when not combined with iron. Chiretta is a coarse gentian. The Senecio Jacobœa or common ragwort is useful as a stomachic tonic, although its bitterness is not very marked. It is usually employed in the form of a one in ten tincture made with proof spirit, the dose being from half a drachm to a drachm of this preparation. Cascarilla is a very pleasant aromatic bitter, and forms an excellent vehicle for alkaline remedies when given without iron.

℞ Pot. Bicarb. gr. x.
Sp. Chloroformi, ♏xx.
Inf. Cascarillæ, ad ℥i.

is a capital combination in the dyspepsia of the gouty, or even where there is excessive acidity of other origin.

The well-known cinchona in infusion is sometimes better tolerated than is quinine in solution. This fact is apt to be overlooked; but it is well worth remembering, and its remembrance is often very useful. We will consider these agents again in their relations as tonics.

The action of these vegetable bitters upon the digestive organs is as inexplicable as it is well assured. Vegetable bitters brace up and harden the mucous membranes, as is seen by their effect upon the mouth. Hence exosmosis is lessened and endosmosis is increased. Digestion is made more rapid and effectual, nutriment is taken up more copiously and more quickly. Even in a healthy person the remains of the last meal are sooner disposed of, and the appetite for the next is sharpened by a bitter. This is the pure action of a vegetable bitter. When mucus is in excess, it interferes much with the taking up of nutriment by membranes, and the checking of its growth is an indirectly constructive aid. Many of the vegetable bitters

contain tannin, or other astringent constituents, and are thus peculiarly suited to the leucophlegmatic or mucogenous diathesis.

This theory at least gives a notion of some kind about their action, and that is not quite a useless matter in giving direction to their therapeutic aim. It fits in with the facts, and in so far is useful. But it cannot be regarded as a true physiological explanation of the action of vegetable bitters. There is no doubt but that these agents do increase the sensation of hunger; and these sensations depend for their expression upon the stomach. Consequently these bitters must have some action, if we only knew it. Equally certain is it that digestion is also furthered and rendered more efficient by their use. They are of avail in furthering digestion if given after a meal as well as before it. But in so doing their appetizing effect is largely lost.

§ 19. After the digestion of starch and nitrogenized principles we come to the digestion of fat. Fat is emulsified mainly by the juice of the pancreas, which contains diastase like saliva, but has also a powerful action upon oleaginous matters. It is a gland about which, in disease at least, we know very little. In health, and physiologically, it has been carefully examined. Bernard found experimentally that ether introduced into the stomach determined soon afterwards a considerable flow of pancreatic juice. This was a very valuable observation at a very important time. The introduction of cod-liver oil by the late J. Hughes Bennett is a matter of our own times; and the importance of a sufficiency of fat for the building up of truly healthy tissues is a comparatively recent addition to our knowledge. The association of the formation of tubercle with a dietary too defective in fatty constituents, the repair so often instituted when fatty food was given and assimilated, pointed distinctly to an increased use of fat by the consumptive. Cod-liver oil is the most easily digested of all fats; and as such has come into almost universal use. In convalescence from acute disease, as well as in the palliative treatment of chronic disease, and especially of consumption, in supporting the system under the severe trial of surgical fever, cod-liver oil has won for itself a well-established position.

One difficulty has always been felt, and it is this. Even

cod-liver oil is not always digested, and therefore something else was wanting. Sir Walter Foster conceived the idea of utilizing Bernard's hint, and so combined ether with cod-liver oil. The increased flow of pancreatic juice so induced led to assimilation of the cod-liver oil, and thus another step forward was made in practical therapeutics. Another effect noticed by Foster was the return of a liking for fat under this plan of treatment, where previously a strong distaste to it had existed. One method is to give from ten to thirty drops of sulphuric ether in the dose of oil; or the ether may be given in water immediately before the oil. The following formula will be found useful:—

Potassæ Bicarb. ℥ iss.
Acidi Hydrocyan. Dil. ♏xvi.
Spt. Ætheris, ℥ iss.
Aq. ad ℨviii.
Misce. ℨi. ter in die sumat.

This method of adding to the usefulness of a course of cod-liver oil deserves wide and general attention.

Pancreatic juice is of value in peptonizing various articles of food, and peptonized milk and peptonized beef-tea are in constant use in the sick-room. Every nurse should know how to prepare these substances. Some years ago a preparation known as pancreatic emulsion was largely given in the treatment of consumption. It was made by pounding the pancreas of the pig with lard and water and then submitting it to the action of ether. A useful substitute may be prepared according to the following formula:—

Prepared Lard, 1 ounce.
Boiling Distilled Water, 2 ounces.
Powdered Tragacanth, 20 grains.
Oil of Peppermint, one minim.

The dose is from one to two drachms in a tumblerful of milk to which a tablespoonful of rum may be added. Many patients get fat on it.

The changes in the pancreas of the calf, its large size and great cell-activity during the suckling period of calf-life, and its

gradual diminution to a fixed size as this food is changed for a vegetable diet, point to the close relations betwixt the function of the pancreas and the assimilation of fat.

§ 20. Assimilation is never very perfectly performed if the action of the intestines be sluggish and imperfect. The waste matters of food must be swept away, out of the small intestines at least, in order that the nutritive material of the next meal may be brought in contact with the intestinal villi and absorbed. In the large bowel some secondary digestion may take place, but it is of questionable utility; and it is practically much better to keep the large bowel unloaded than to look for anything from secondary digestion. The accumulated fæces are very apt to become hard and pouched in the folds of the large intestine, and so become the cause of much disturbance. The mere load, and its pressure on parts around, are often sufficient to interfere sorely with the functional activity of a susceptible and feeble stomach. In many persons digestion is never comfortable nor effective while the bowels are loaded. The enormous consumption of aperient pills, quack and other, in this country, to say nothing of aperient waters, testifies to the widespread conviction on this head. The use of an aperient pill at bed-time and a draught of cold water first thing in the morning obtains largely; and might with advantage obtain still more largely. The purgative in such cases may well be accompanied by some nux vomica, which excites the vermicular contractions of the muscular coat of the bowels. A carminative may be profitably combined. A good pill for common use would run so :—

Ext. Nucis Vom. gr. i.
Pulv. Piper. Nig. gr. i.
Pil. Coloc. Co. gr. ii. ss.

at bed-time every night, or every second night; or instead of this, Pullna, Hunyadi Janos, Fredericshall, or Marienbad water may be taken; the dose apportioned to each individual and his exigencies, according to the directions given with each bottle. A certain action upon the bowels is often beneficial, especially to those who control their bowels from social necessities. Such persons are all the better for occasional purgation. A slight

amount of purgation is almost always indicated in the commencement of a course of hæmatics, especially chalybeates.

§ 21. *Hæmatics.*—This is a very important group of agents, though its members are few. Hæmatics furnish to the blood matters which are defective in our dietary. They are indeed foods rather than medicines; though a hæmatic may of course be used in what is truly a medicinal dose. Hæmatics go to build up the blood, to increase blood formation, and with it the growth of every part which is fed by the blood, and that is, in fact, the whole system. One of the group is phosphate of lime. Especially useful is this agent during the period of growth. Wherever cell-growth is active, there is phosphate of lime in excess. Over-worked town individuals and over-suckling mothers, as well as growing infants, are benefited by this hæmatic. It is especially useful in rickety children. It controls morbid nutrition of the skeleton, while it supplies the lime for proper ossification. It is not needed in large doses. In fractures of bones in pregnant women lime is useful. The administration of lime during pregnancy in women whose previous children have shown tendencies to rickets is yet untried; but it seems to offer a good and hopeful prospect.

Of all hæmatics, however, *iron* stands first—preëminently first. It is rather a food than a medicine. Iron is a constant and necessary constituent of the body, and must be regarded as an important food.

Iron, though a normal constituent of the body, is chiefly present in the red blood corpuscles, though there only to a limited extent. By its use we can increase the amount of hæmoglobin, upon which the chemical interchanges conducted by the red blood corpuscles depend. Under its use in anæmia, the cheeks grow rosy, the lips recover the usual colour, the eye brightens, the tongue is less flabby, there is a general increase in body-weight, a development of muscle, and a heightened condition of nerve action. Tone is given to every part of the system. Iron salts in anæmia possess important properties other than influence over the growth of the corpuscles. They act bracingly in the relaxed mucous membrane of the digestive canal, and probably in this way tend to restore its functions. Moreover, it is probable, that after its entrance into the blood, the iron exerts

an influence beyond that of merely increasing the quantity of red corpuscles. Iron preparations are useful, not simply as a food in promoting the formation of the blood-discs, but from their beneficial influence on the tissues of the body. Iron cannot be regarded merely as a food to the system; it is also an important curative agent. Large quantities of the soluble astringent preparations should be administered where we desire to benefit tonically the mucous membrane of the digestive canal and the tissues. Iron may be given as a hæmatic, and it may be usefully given in larger quantities than can be utilized in the blood. The excess acts as a tonic.

When given to healthy persons for a long period, iron produces plethora, or an excess of red blood corpuscles. When given to anæmic persons, it raises the condition of the blood to that of health. After a time the blood appears, as it were, to become saturated with it, and ceases to assimilate it. In certain chronic conditions it is difficult to see any point of saturation; and iron may in many cases be usefully continued for years.

What becomes of the excess of iron in the blood? It is chiefly cast out in the fæces, which become black from the union of the iron with the tannin in the fæces, or the sulphuretted hydrogen it meets there. It is also eliminated in the urine. Brücke found that in rabbits, after a time, nearly all the ingested iron could be recovered from the urine. Quevenue found it as a normal constituent of urine; and Becquerel has observed the amount found in the urine to vary with the amount given.

Iron in all its forms is useful. Almost all preparations of iron are more or less astringent, and, when in the blood, probably exert a direct influence upon the tissues, contracting them, not merely by increasing their tone, but also by acting on their vital contractility. Much difference of opinion exists as to the best forms of iron for common use. Some advocate iron in powder; others as haloid salts; while some prefer what are called the lighter preparations, as the ammonio-citrate and the potassio-tartrate. It is a good plan to commence, in convalescence, with the lighter preparations, and then go on to stronger forms. Much will depend upon what it is desirable to combine with it. For instance:—

Ammon. Carb. gr. v.
Ferri Ammon. Cit. gr. v.
Inf. Quassiæ, ad ℥j.

is a capital form in early convalescence, or in the treatment of amenorrhœa. After a time the following may be substituted for it with advantage:—

Ferri et Quiniæ Cit. gr. v.
Liq. Strychniæ, ♏iv.
Inf. Calumbæ, ad ℥j.

This forms a beautiful tonic—effective, agreeable, and pleasing to the eye.

A common form which has long been a favourite is the following:—

Quin. Sulph. gr. i.
Tinct. Fer. Perchlor. ♏x.
Acid. Hydrochlor. Dil. ♏iij.
Inf. Quassiæ, ad ℥i.

Often the iron constipates, and then the addition of sulphate of magnesium is of service. The following is a typical prescription:—

Quinine Sulph. gr. i.
Magnesii Sulph. gr. xx.
Liq. Ferri Persulph. ♏v.
Acidi Sulph. Dil. ♏v.
Infus. Quassiæ, ad ℥i.

If this is not readily absorbed, a few drops of tincture of capsicum may be added.

For a permanent prescription, requiring to be continued for months, a pill is the best form. It admits of a large supply of material in a small space; the nausea of the disagreeable taste daily for months is also avoided; it does not affect the teeth, and it can be taken after food without attracting attention. The following is a very favourite formula:—

Acidi Arseniosi, gr. i.
Ferri Sulph. Exsic. gr. xx.
Pulv. Capsici, ℥ i.
Pil. Aloes et Myrrh, q. s.
in pil. LX. div. 1 semel aut bis in die.

Taken immediately after a meal, this is a digestive and tonic pill of the highest value.

One beautiful preparation of iron should not be forgotten; it is often well borne when other forms are not tolerated, and consists of the recent addition of the tincture of iron to acetate of ammonia.

Tinct. Fer. Perchlor. ♏x.
Liq. Ammon. Acet. ad ℥i.

It is beautiful to the eye, palatable, and in consequence of the decomposition produced, readily assimilated. Many medical men attach very little importance to the non-astringent preparations of iron as therapeutical agents, and always give the perchloride of iron or the sulphate in large doses. There can be no doubt that in many cases where the scale preparations of iron have failed to effect any beneficial result, fifteen minims of the perchloride in an ounce of water with glycerine and spirit of chloroform three times have afforded prompt relief. This is especially true of marked cases of anæmia.

There are many excellent preparations of iron which can only be alluded to now as occasionally furnishing a more suitable form than any here given. There is the Ferrum Redactum, Vallet's ferruginous pills (carbonate of iron), Griffith's mixture (Mist. Ferri. Comp.), Blancard's iodide of iron pills, the Syrup of Iodide of iron, Chemical Food (phosphate of iron and lime), &c. Then there is Dialysed Iron, a mild and non-astringent preparation: it is readily digested, it does not affect the teeth, and its taste is not objectionable.

There is no doubt that at the present moment the most popular preparation is Blaud's pill. Some people seem almost to live on it. It is put up in all kinds of shapes and forms, sometimes with arsenious acid, or nux vomica, or cascara sagrada. Whether it has lived up to its reputation is quite another

matter. Many good chemical observers say that in obstinate cases of anæmia they get far better results from five grains of dried sulphate of iron made into a pill with a drop or two of simple syrup, and administered three times a day after meals. The iron is not assimilated, and does no good unless the bowels are opened freely once a day.

Iron is sometimes given with advantage in the form of a natural water. The Flitwick spring, situated near Ampthill in Bedfordshire, yields a chalybeate water containing 170 grains of iron as a per-salt in the gallon.

The addition of iron to the food often produces effects little less than marvellous. It not only gives tone to the whole system, but nutrition is markedly advanced by its presence in the fluids of the body. This is often well shown in the improvement in a feeble heart under a course of iron. Digestion becomes more perfect under the use of chalybeates. Digestion cannot be normal when the blood has ceased to be so. Every part seems to perform its function more efficiently under the stimulus of iron, of blood once more rich in one of its most important constituents.

The conditions which call for the administration of iron are *par excellence* those where debility is combined with anæmia. In these conditions iron acts as a general tonic as well as increasing the number of the red blood corpuscles. But there are certain circumstances which contra-indicate the use of iron, and are deserving of note and remembrance. It is not enough to say that in conditions of plethora and vascular fulness iron should not be given. There are other conditions in which it is well to resort to other tonics, and even to other remedial agents altogether. Pereira says that the contra-indications are "great strength and activity of organs, excessive tonicity (characterized by a firm and tense condition of the solids), and redundancy of the red corpuscles of the blood—as in general excess of the blood (plethora), in fever, in acute inflammation, and in the sanguine temperament. To these may be added, congestion, or a tendency thereto of important organs, especially of the brain and lungs, and intestinal irritation." Again he says, "Administered in large quantities, or when the alimentary canal is in an irritable condition, all the compounds

of iron are liable to excite heat, weight and uneasiness at the precordia, nausea, and even vomiting, and sometimes purging."

From the well-known action of iron in increasing the red blood corpuscles no one would now think of giving iron in states of vascular fulness. It is unnecessary to say anything further on this subject. Then again conditions of vascular excitement are unsuited for the exhibition of iron. As long as there is rapidity of pulse combined with rise of temperature, so long must iron be withheld in the treatment of acute disease. When the convalescence is well established, when the pulse may be fast and small, but is without excitement; when the temperature is perfectly normal or below it; when the skin is cool, the face pale, and the tongue clean, then, and not till then, should the administration of iron be commenced. If it produce any gastric disturbance, or headache or feverishness, it should either be totally abandoned for a time, or the dose be much reduced. Vegetable tonics, as quinine or strychnine, together with mineral acids, the hydrochloric, the phosphoric, or the hydrobromic even in some cases, should be given instead; and then the iron, in small doses at first—to be taken after meals, especially dinner. So administered iron can often be tolerated, when it disagrees given in the usual way in combination with the vegetable tonics. The same rule holds good of the resort to iron when the pyrexial stage of ordinary phthisis has passed away. The tonics and acids must be given before food, and the iron after, either as the tincture of the muriate in acetate of ammonia, the carbonate, or Niemeyer's pill of sulphate of iron with carbonate of potash in a drop of syrup. But as long as the tongue is thickly coated, or red and irritable, it is well to withhold chalybeates altogether.

This is especially true of phthisis. However much the general pallor, the lack of tone and loss of power seem to call for iron, it is useless, and sometimes worse than useless, to give it unless the tongue be clean, without irritability. If the tongue be red and irritable, bitters with bismuth are to be adhered to, until all intestinal irritability has passed away, of which the condition of the tongue is the best index; if the tongue is loaded with fur, bitters and acids are to be preferred with a little sulphate of magnesia, or a vegetable pill at

bed-time; or both if necessary. The gastro-intestinal canal must be got into a normal condition, neither too irritable, nor sheathed with a layer of epithelium, as indicated by the fur upon the tongue, before either chalybeates or cod-liver oil can be satisfactorily prescribed.

In ordinary convalescence from acute conditions it is well to commence with the lighter preparations, the ammonio-citrate, the tartrate, or the citrate of iron and quinine; afterwards the perchloride or the sulphate will be tolerated equally well. But these latter forms often disagree during the early stages of convalescence. At times too the mixture of the sulphate of iron, with quinine, and a few drops of dilute sulphuric acid, is found to be heating, and each dose to make the patient uncomfortable, especially in warm weather; here the addition of a little sulphate of magnesium, not necessarily to the extent of producing purgation, will at once remedy the uncomfortableness so induced.

In atonic gout also iron is commonly of no service, and makes the patient uncomfortable. In the sanguine and plethoric forms of gout iron is never indicated. But where there is evidence of chronic renal disease with anæmia, and even with albuminuria, then it commonly seems desirable to administer iron in some form. Very often, however, it distinctly disagrees. It is well to see that there is no acute action going on anywhere, that the joints are cool, even if still enlarged, before commencing with chalybeates. The bicarbonate of potassium, or the potassio-tartrate of sodium, with a little nux vomica, in infusion of buchu, with a liberal draught of water after each dose, are the medicinal agents to be adhered to until all is perfectly quiet. When the tongue is clean, the skin cool, and there is no evidence of much acidity, then small doses of iron may be commenced with. But for some time the iron and the potash should be taken together; if the potash is left off the iron disagrees. Especially is this the case with elderly persons. It may be laid down as a broad rule that the toleration of iron diminishes as the age increases. With old persons iron comparatively rarely agrees, and then only in very small doses: while young children take iron well, and it often is well borne by them in conditions which in the adult distinctly forbid its use. But as age advances the

system seems to grow less tolerant of the drug in any form; and the dose must be much diminished. In advanced life, in convalescence after acute disease, or paroxysms of gout in any of its forms, chalybeates have often to be abandoned, and alkalies, as potash or ammonia, with vegetable tonics and bitters, substituted in their stead. It would seem that the power of the digestive organs to assimilate iron is strongest in infancy—except it be very young children and babies—and that it diminishes, until in advanced life the blood manufacture often appears to be interfered with rather than assisted by chalybeates. Consequently with old people it is often better to give them tonics with alkalies and easily digestible food, than to give iron, when it becomes desirable to give a fillip to their nutritive processes.

There is one condition where iron is absolutely forbidden, and that is the condition known as biliousness. As long as there is a foul tongue, a bad taste in the mouth, and fulness of the liver, with disturbance of the alimentary canal, iron is to be prohibited; it is not only that it is of no service, it positively does harm. It aggravates all the symptoms and intensifies the condition. Iron undoubtedly increases the oxidizing processes, but somehow or other in biliary disorders it does not suit. Defective oxidation is at the root of these states, and yet iron does not agree with such patients. As long as any of the symptoms remain, and there is any fur whatever on the tongue, iron must be withheld. The patient may be anæmic and iron seems to be urgently indicated, but it will do no good until the system is in the proper condition to receive it. The liver must be thoroughly unloaded by alkaline salines first; then some strychnia and nitro-muriatic acid may be taken in the day, the salines being only taken first thing in the morning; and ultimately, when the liver is once more working efficiently, chalybeates may be prescribed. But it seems that the oxidizing power of iron embarrasses rather than aids the liver when working inefficiently; and when iron is given, the morning purgation of salines, mineral waters or other means, should still be maintained. By attention to these points much may be done for bilious patients, and much discredit avoided. Whenever, indeed, there is disturbance of the gastro-intestinal canal, bilious or other chaly-

beates are contra-indicated, and if given cause discomfort, nausea, and not uncommonly a pyretic condition. The digestive organs must be got into good working order before iron is administered if it is to be properly assimilated. When given in large doses iron always blackens the stools, but if given in moderate doses and well assimilated this blackening of the stools is not so marked. The colour of the stools, then, may be utilized as an indication as to how far chalybeates are assimilated and are likely to be useful.

There are two different states found in women where iron is either totally contra-indicated or to be given with great caution. The first is the condition of amenorrhœa in florid, plethoric persons. In such cases, especially if the patient be of tense fibre, depletory measures are to be resorted to, as local bleeding and free purgation. The other is the opposite condition of menorrhagia in certain females. Of course no one would think of resorting to any form of iron, however astringent, in those cases of menorrhagia which are due to a state of general plethora. But there are cases of menorrhagia associated with pallor and debility, where the usual compound of iron and extract of ergot is not so useful as is a non-chalybeate treatment. In these cases it is not any imperfection in the processes of blood manufacture which is to be remedied, for the blood is made rapidly and quickly, only to be lost at each menstrual period. An irregular process of rapid blood-making with still more rapid blood-loss is established and requires its appropriate treatment. It is undesirable to stimulate blood-formation by chalybeates here, for the greater the increase in the bulk of the blood, the more excessive the catamenial loss; and to give iron is but to aggravate the condition. It is here desirable rather to limit the rapidity of the blood-formation, so that when the general vascular turgescence of the menstrual period comes, it will not find the blood-vessels too distended with blood. This will lead to diminished catamenial loss, and so the blood-waste will be economized. For in these cases it is the proper practice to lessen the loss rather than to stimulate blood-formation. During the interval a little sulphate of magnesia, with dilute sulphuric acid, in some infusion of a vegetable astringent, forms an appropriate medicinal agent, and should be given along with

a restricted dietary. At the periods the dose might be increased and the patient kept quiet, while all aliment should be cold. By such a plan the irregular condition of rapid blood-formation and blood-loss will be converted into a steady state of slower blood-formation with diminished loss. The same rule holds good of other periodical hæmorrhages, and especially of some forms of hæmoptysis.

Even in cases of menorrhagia where it is necessary to encourage blood-formation during the interval, it is often well to cut off the chalybeates a day or so before the menstrual molimen, and to substitute for it the mixture just mentioned above. By such plan the blood-waste by the catamenia is economized, and the necessity for great blood-formation minimized.

Finally, the consideration of iron here is confined to its use as a hæmatic, its use in pyrexial affections as erysipelas or scarlatina not being included. When used as a hæmatic, it is clear that certain points must be kept in view. First, that the digestive organs be in fair working order, and second, that certain precautions be taken as to its administration when it is necessary to resort to it.

When iron is given as a hæmatic or tonic it is well for it to be taken after food. This should be made a broad rule in practice. It is, however, convenient at times—as when iron is given along with potash or bitters—to depart from this rule.

One remarkable thing about the action of iron is its effect upon the dyspnœa of chlorotic girls and others. In these cases there is pallor, amounting often to waxiness, from absolute diminution in the number of red corpuscles, and marked shortness of breath on exertion, from lack of these oxygen carriers; there is general loss of body temperature from imperfect combustion or oxidation, while what ought to have been burnt is stored up as fat. In fattening cattle, farmers often bleed an animal which is not fattening quickly, in order to artificially produce anæmia. Under conditions of anæmia changes take place spontaneously such as the farmer induces deliberately, especially in young and not fully-grown persons, chiefly girls. Iron soon induces a change, and restores matters to their normal condition. It must, however, be borne in mind that when the blood is either broken down, or its formation

hindered by some blood poison, iron will not cure the anæmia unless combined with some specific remedy to the poison in each case. For instance, in lead-poisoning iodide of potassium is absolutely requisite to good blood-formation; in syphilis, mercury; in gout, potash; in malaria, quinine should be added to the iron. It is matter for surprise how little this fact is recognized. Often, indeed, these specifics are true hæmatics, by destroying the poison which is exerting so injurious an influence upon the blood. The question of the effect of imperfect elimination and its consequences upon the blood will be considered in the next chapter.

There are other hæmatics, as soda, potash, &c., which require a word. Sodium is a natural constituent of the blood. As chloride of sodium it forms an important addition to our food, and the consequences of its withdrawal are so baneful, that it formed a terrible old Dutch punishment. Water and bread made without salt was one of their most exquisite tortures. The decomposition of common salt furnishes hydrochloric acid to our gastric juice, and soda to our bile-salts. African tribes will, like the buffalo, travel several hundred miles to procure this coveted addition to their food.

§ 22. Ere leaving the subject of hæmatics a few words are essential as to the value of water as an adjunct. All the hæmatics are soluble, and require water for their solution. Not only that, but it is a well-known fact that systems often can be brought under the influence of iron at chalybeate spas which have resisted all medical treatment, no matter how ingenious or varied. The difference has been found to lie in the amount of water. In all natural waters the iron exists in a state of high dilution, and a large bulk is required to furnish any material quantity of iron to the system. Chalybeate remedies may be rendered much more effective by adding to them large draughts of water; amidst the humbler classes, where a sojourn at a spa is simply impossible, such addition is often of the highest service. Especially is this the case where chalybeate and alkaline remedies are combined, and given before food. A draught of water, varying from half a pint to a pint, after each dose, will often make all the difference between no benefit and the most satisfactory treatment. The dilution has the

most excellent effect, and iron so diluted is absorbed when in a concentrated form it is not assimilated.

Under certain conditions, water is a hæmatic. All substances which are held in solution by the water of the blood must escape wherever there is a free outflow of water, whether by kidneys, skin, or bowels. In cases of lithiasis this is especially noticeable, and furnishes an explanation of the excellent effects often derived from a stay at hydropathic establishments. Not only does water wash away the waste matters which have accumulated, but in doing so it paves the way for the growth of new material. If water drinking exerted only a disintegrating influence, it would merely lead to loss of weight; but simultaneously with this rapid disintegration, a corresponding increase of assimilation takes place in the same tissues; whence it happens that water, taken under certain precautions, may increase both construction and destruction of tissue, and act as a true tonic, improving the vigour both of body and mind. Further, there is reason to believe that too little water is drunk by most persons, especially in the upper classes. The thirst produced by labour compels the drinking of water. Those who are not compelled to labour are very apt to diminish their bulk of water to an injurious minimum. Doubtless its effect upon the bladder is occasionally inconvenient, especially in certain places of common resort, and especially to ladies. Also its tendency to appear through the skin as perspiration is at times inconvenient. Nevertheless the consumption of a fair amount of fluids per diem is an excellent measure, and ill-health is commonly the penalty for the abstinence so practised. A draught of cold water every morning is an excellent hygienic measure; it stimulates the action of the bowels; it is a tonic to the digestive organs; and it is a true hæmatic, by its removal of waste matters which hinder histogenesis. This effect is very much increased when the water used is from some natural spring. The use of mineral waters as beverages is much on the increase. This is good in several ways. These mineral waters are often pleasant medicines. But more than that, these palatable and trustworthy waters will lead to more water drinking—to the ingestion of more fluids.

§ 23. The next class of remedies which claims our attention is scarcely inferior in value to that just considered. This class is that termed *tonics.*

A tonic (from τείνω, I stretch) is an agent which has a systemic action. The ruling idea is that it gives tone, just as the tightening of a cord or wire causes it to give out a better tone. A tonic differs from a stimulant in that its action is not merely temporary and exhaustive, leading to reaction. The effect is more permanent and lastingly beneficial. Neither does the action depend upon astringency. Doubtless tannic acid is often a tonic, and that too by its astringency; but quassia contains no tannin, and quinine is as tonic as cinchona bark. Nor again does the tonic action depend on any aromatic qualities, for many tonics are decidedly not aromatic. They do not merely act on the muscular system, though that develops under their use. They act upon mucous membranes in restoring them to a normal condition, and very frequently tonics add very much to the efficacy of astringents. What their action upon the mucous lining of the intestinal canal is we do not know. But we know well enough that under their use the appetite returns and digestion improves. The effects of tonics on the system are never rapidly displayed; but after they have been taken for some time their influence is obvious by the increased force of the circulation, the greater energy of the digestive organs, the improvement of the secretions, the abatement of nervous susceptibility, and the augmented power in particular which is communicated to the muscular system. The effect of a tonic, when administered under proper circumstances, and when it operates favourably, is, in fact, to place the system in that state which characterizes health. Tonics have been but little lighted up by modern physiological investigation. All we know of them is derived almost solely from empiricism. But our knowledge is not stinted, and tonics form one of the most important therapeutic benefits obtained from empirical observations. Not only has empiricism given us tonics, but it has also furnished us with many little hints as to the best means of securing their action, and of the different circumstances which should guide us in their use and selection.

In the first place, tonics are both mental and material.

Hope is a capital tonic. Depressing mental conditions often neutralize the best plans for administering tonics and thwart our desires. The prospect of recovery will often bring about satisfactory results almost in the absence of material tonics, and certainly often helps out wonderfully a lame line of treatment. Mental tonics can usually be advantageously combined with material tonics.

Material tonics are usually bitter, often aromatic. The aromatic principle is commonly stimulant, and consequently aromatic tonics as cusparia, cascarilla, &c., are often given in early convalescence. Many are also astringent, and this astringency often is a useful property. Astringent tonics are indicated when there exists any tendency to excessive secretion, as undue perspiration or looseness in the bowels. Sometimes, if given too early, they produce disturbances in the bowels. If their dose is not proportioned to the susceptibility of the digestive organs, they may not only cease to produce a tonic effect, but absolutely destroy the appetite and give rise either to diarrhœa or constipation. It is, moreover, a familiar fact, that a febrile state of the system altogether contra-indicates their use, because they then derange the stomach and augment the vascular excitement. For many years the plan of giving large doses of quinine—an unquestioned tonic—to lower the temperature in pyretic affections has obtained with many competent authorities. Nevertheless, the rule not to give tonics during conditions of febrile excitement is a good one. During the presence of a pyretic condition, especially in connection with acute disease, it is well to stick to small and frequently repeated doses of tincture of aconite. When the temperature has fallen somewhat, and the fever is defervescing in its other symptoms, then an aromatic bitter may be given with advantage. The prescription of dilute phosphoric acid ℥xv. and infusion of cascarilla ℥i. is a good and suitable one, or a certain amount of a stimulant may still be necessary, and then something like the following prescription is indicated:—

Acid. Hydrochlor. Dil. ℥x.
Sp. Chloroformi, ℥xx.
Inf. Cuspariæ, ad ℥i.

It is a good plan to gently act on the bowels at the commencement of a course of tonics after acute disease. A dose of cascara sagrada or of aloes is suitable, the latter being prescribed either in the form of the compound decoction or as the pill of aloes and myrrh. Aloes, indeed, itself possesses a bitter principle of no mean properties as a tonic. Often, especially after the violence of an attack of bronchitis is over, carbonate of ammonium is a good stimulant to combine with tonics. It goes specially well with ammonia, citrate of iron, and quassia. Quinine may often be given with advantage along with some acid in an aromatic tonic.

Quininæ Sulph. gr. i.
Sp. Chloroformi, ℥xx.
Acidi Hydrochlor. Dil. ℥v.
Inf. Cascarillæ, ad ℥i.

forms a pleasant and efficient tonic. When tonics disagree with the stomach several measures may be indicated. A change in the form of the tonic is one; the addition of a carminative is another. At other times a slight action on the bowels is desirable, and a little sulphate of magnesia removes the constipation. Often a mineral acid is indicated; if a small quantity has already been added, it is well to increase the dose of it.

Tonics are especially useful when given with iron, and this well-known association has made the expression "iron and bark" one as well known in the household as in the lecture-room. There also exists in the minds of many a strong impression that the lighter forms of iron, as the ammonio-citrate and the potassio-tartrate given in quassia or calumba are better agents to commence with than the more powerful and astringent preparations. A patient recovering from an acute ailment was ordered quinine and the muriate of iron. This disagreed with her, and the ammonio-citrate in calumba was substituted for it. This agreed perfectly, and at the end of a week the former mixture was resumed, and was then taken without discomfort.

Quinine is the type of tonics, yet it does not agree with every one. Many East Indians volunteer the information that they either cannot take quinine, or it does not do them any good.

There is one matter of some importance about quinine not sufficiently well known, and that is its tendency to produce irritability in the bladder, especially in elderly people. In fact it is not so well suited to elderly persons, as a rule, as to the young, the adult, and the mature. The elimination of the salts of cinchona with the urine exposes these organs to irritation. If the urinary tract be anywhere the seat of disease, it is apt to be aggravated by these medicines. This effect is frequently observed in gonorrhœa. Sometimes, independently of such a cause the patient is affected with irritation about the neck of the bladder, with hæmaturia, or with retention of urine.

"When quinine is given internally in large doses a series of symptoms is produced to which we apply the term 'cinchonism,' or 'quinism.' These doses affect the sight and hearing, excite subjective noises in the ears, as of bells ringing, and occasionally produce deafness, which may be permanent, but is usually temporary and lasts only a few days. Large doses often dim the sight and cause temporary blindness. Severe frontal headache, with dull, heavy, tensive or agonizing pain, may be experienced. The face is flushed, the eyes are suffused, and the expression is dull and stupid. These symptoms are due to the action of the drug on the brain. Sometimes quinine brings out a rash which may be followed by desquamation. Some people are peculiarly susceptible to the action of cinchona and its alkaloids" (Murrell, *Pharmacology and Therapeutics*).

There is a large amount of acquired skill in the right selection and combination of tonic remedies which cannot be transmitted at once to another. But by careful observation the young medical reader will learn for himself what it is impossible to communicate by writing. The very fact that there is something to be learnt that cannot be so conveyed will certainly stimulate many to find out what that something is. Those who succeed will find in their knowledge the reward of their labour, while those who decline to observe their experience intelligently will have to go without the benefits they would otherwise receive. That something is the power to see a relationship betwixt a certain case and one previously encountered, which indicates that the plan necessitated in the previous case will be the one best suited to the present one.

§ 24. In addition to the tonics described above, there are the common tonics of pure air and water. That persons who breathe pure fresh air, and drink pure and uncontaminated water, are in a better state of health, have more tone about them, is demonstrated by the effects of epidemics. When the air is foul and the water filthy, their systems succumb to the onslaught of zymotic affections more extensively than do systems existing under better hygienic arrangements. The establishment of convalescent homes in the country, in connection with metropolitan hospitals, is a proof of the tonic effects of good air and water. In private practice it is the rule to send patients away to health resorts, if the conditions of life are such that their home surroundings are not quite what they might be. The change of air annually indulged in is a famous tonic.

Then there is also the effect of cold water upon the skin—no mean tonic. The bracing effect of the sudden chill, the sense of energy it gives, the glow which follows, all tell of the tonic effect of cold bathing. Experience has decided that the good effects of cold water are increased by its being salt. Consequently it is very common for convalescents to prefer the seaside, where they can have sea-bathing combined with fresh air and pure water. For children, the addition of sea-salts to the water in which they are bathed is often beneficial; and a substitute for a sea dip is thus furnished, not altogether without value. Still it is a substitute, and nothing more.

Assimilation is an important part of nutrition; and the best energies of the medical man are often bent earnestly towards securing it by the various methods that have been just described. The necessity for good and perfect excretion, in order to permit of healthy tissue growth, will become apparent in the course of the next chapter. How the body waste may check nutrition will be shown; and the proper combination of agents aiding in excretion, with those conducing to better assimilation, will be pointed out.

Before leaving this chapter, however, there is one point on which some stress must be laid; and that is the peculiarities of some individuals. There are some organisms which seem to perform a maximum of work with a minimum of waste.

There are others again which consume a large quantity of fuel, while they leave a huge quantity of ashes, and only perform a small amount of work. If these latter are to be so fed that there shall be but little ash and waste, they will simply perform no work at all, they will die out. It is not only in animal organisms, so varied and diversified, that this occurs. It is to be seen in furnaces, engines, and flues. Some work with very little waste, their combustion is perfect. While others always need to have their refuse removed, else they cannot get on at all. So it is in certain systems. If we attempt to reduce their supplies to what they can perfectly consume, we simply starve them. Their supplies must be liberal, and the removal of their waste constant. There are many people who consume a large amount of food—indeed without it they could not work at all—who are all the better for occasional, almost, in some cases, persistent purgation. They are always having too much bile in their intestines, and they seem to get on better with having it swept away than when it is reabsorbed and an attempt made to consume it. It would seem that they do better when their bile is always freshly made than when it is taken up from the chyme. Limited quantities of food do not prevent these people being bilious. What they want is to have their spare bile got rid of. Regular action in the bowels, especially by alkaline purgatives, good food, and a tonic occasionally, enable these individuals to reach a much higher standard of health than they usually attain. They are wasteful organisms, it is true; but it is no good destroying them in attempting to make them more economical. They require that plan which enables them to work best.

CHAPTER III

EXCRETION

§ 25. HAVING seen the importance of a healthy assimilation in the production of normal nutrition, we now come to the question of excretion. This is a much more important subject than is usually supposed. "In a body which is neither increasing nor diminishing in weight the output must exactly balance the income, and all that enters the body must sooner or later, in however changed a form, escape from it again. In the expired air, the urine, the secretions of the skin and the fæces, by far the greater part of the waste products is eliminated. Thus the carbon of the absorbed solids of the food is chiefly given off as carbonic acid by the lungs: the hydrogen as water by the kidneys, lungs, and skin, along with the unchanged water of the food; the nitrogen as urea by the kidneys. The fæces represent chiefly unabsorbed portions of the food. A small and variable contribution is that of the expectorated matter, and the secretions of the nasal mucous membrane and lachrymal glands. Still smaller and still more variable is the loss in the form of dead epidermic scales, hairs, and nails. The discharges from the generative organs are to be considered as excretions with reference to the parent organism, and so is the milk and even the fœtus itself with respect to the mother" (Stewart's *Manual of Physiology*).

We have for long been familiar with the gravity of imperfect nutrition; but are not equally intimate with the still graver subject of defective excretion, and the evil effects of imperfect elimination. It is not merely that life soon becomes extinct if the different excretory actions of the body are not carried out—

a method of destroying life much more rapid in its action than the withholding of ingesta—but it is also the more chronic action of imperfect elimination which is fraught with grave issues. The importance of the functions of egestion as compared to those of ingestion was insisted upon by Marshall Hall in 1842. The system is soon poisoned if it cannot get rid of its own carbonic acid. The excreta of the urine are powerful neurotic poisons, causing coma and convulsions; and bile is equally destructive to life in large quantities. It would appear indeed that the assimilation of food is accompanied, or followed by the production of principles of a preëminently destructive character, either as injurious products of the food taken when split up, or as waste matters—the result of histolysis. Very grave, indeed, are the questions relating to retrograde metamorphosis within the organism. Especially is this the case with nitrogenized principles. These nitrogenized matters do not merely go towards tissue formation, and then, by a process of oxidation, pass from one form of histolytic product to another. They do not break up in tissue destruction into creatin, creatinin, tyrosine, and other early products of tissue decay, and then pass on into uric acid and urea merely; each form being in large amounts a dangerous poison. They also form within the animal organism ferments which exercise no unimportant function. Pepsin, so powerful a ferment in the production of the digestion of albuminous matter, is a secretion, and in so far an excretion of the stomach by means of its follicles. Ptyalin is the ferment of saliva, very effective in the conversion of starch into sugar. Pancreatine is another albuminous ferment, formed in the pancreas, also possessing marked power as a digestive agent. These different products are in so far excrementitious, that they are thrown out of one part of the system, and yet they are most effective in promoting digestion by their action upon the material which is furnished as food. These excretions are valuable digestives and ferments. The salivary, the gastric, and the pancreatic fluids all contain an animal principle nearly allied to albumin; but this principle seems to be in a state of change, or of incipient decomposition; and it is not improbable that whilst this very condition renders the albuminous matter useful in promoting the solution of the

aliment, it renders it unfit to be retained within the circulating current.

There are also albuminous ferments scattered through the body, which cause, it is believed, the changes which give us our body heat. The glycogen stored up in our livers, and there reconverted into sugar, is broken up into lactic acid, and this acid, uniting with the soda of the blood, is gradually oxidized, and the oxidation of lactic acid, as lactate of soda, causes our body heat. The production of waste matters in excess, by the action of these ferments when over active, is a matter just coming within the range of our physiological vision. There are already indications enough to give us grounds for good expectations from it.

Before we go further with excretion by the different organs, we must first look at excretion in its entirety. Thus. in the lowest forms of life, we find the surface generally excretory, as it is also generally tactile. But as certain portions in time manifest greater activity in certain directions, and form the rudiments of special senses; so apparently there are certain areas which are more active than others in the excretion of waste products; and so we get the rudiments, the first shadowings out, of special excretory organs. As these develop, they come to possess certain specialities; yet nevertheless they do not lose altogether their primitive characteristics as part of a general excretory surface.

In every instance, the excretory organ consists essentially of a limitary membrane, which forms part of the integument of the body, or of its involutions, and of cells covering the free surface of that membrane, and consequently in direct relation with the external surface. Thus we have the limitary membrane of the true skin, and of the mucous membrane of the alimentary canal, which is directly continuous with it, sunk into follicular depressions; and the free surfaces of these are lined with cells, the layers of which are continuous with those of the epidermis and of the gastro-intestinal epithelium respectively. We trace inwards another extension of the same membrane along the genito-urinary passages up to the kidneys, where it forms the wall of the tubuli uriniferi; and there, too, its free surface is covered with an epithelial layer of cells, which

is the efficient instrument of the selection of the constituents of the urinary fluid, and which, when exuviated, is conveyed along the urinary passage to the exterior of the body. So, too, the hepatic cells, by which the biliary matter is eliminated from the blood, are brought into direct continuity with those of the external surface, through the hepatic ducts and gastro-intestinal mucous membranes. The case is not different, in any essential respect, with regard to the organs by which the recrementitious secretions are formed. The lachrymal, salivary, pancreatic, and mammary glands are in like manner composed of a continuation of the limitary membrane of the true skin, or of the mucous membrane lining the alimentary canal, involuted into tubes and follicles, the free surfaces of which are covered with epithelial cells. These cells, drawing into themselves certain constituents of the blood, are cast off when they have completed their full development, and their contents, set free by the disintegration of the cell-walls, are carried off by the ducts, which collect them from different portions of the glandular structure, and deposit them in the situation where the purposes of the secreted product are to be answered.

We thus get a clear view of the community of origin of the different excretory organs. We can see how, gradually, the function of each has become more and more specialized, until we have the different systems distinctly established. The air-tubes are nothing more than involutions of the general tegument, by whose means the respiratory changes are carried on. They also furnish the means by which oxygen is brought within the system, to perform its combined action of the production of force, by the oxidation of material within the body, and of the removal of waste. While permitting of the chemical interchanges which furnish oxygen, and also of the removal of carbonic acid, these air-tubes resemble the skin, in that they provide a large surface, from which water may exhale. The air-tubes, with their alveolar pouches in the lungs themselves, are an involution of the general tegument, preserving many of its primitive characteristics. The lungs and skin give off the water of combustion within the body. The kidneys represent the ingested water rather, and their secretion varies with the amounts of fluid imbibed. There is a general play, backwards and forwards,

betwixt these excretory organs in the elimination of water from the system, occasionally interfered with, or augmented by the action of the gastro-intestinal canal. The skin and kidneys play backwards and forwards very much according to the temperature; in hot weather the skin is most active, in winter the kidneys. Agents like potash act as diuretics, or diaphoretics very much according to the temperature surrounding the organism. It is not in the elimination of water merely that the mutual action and reaction of the skin and kidneys are demonstrated. They each excrete, along with water, waste products and salt. Long ago Nysten observed that urinous products were given off by various emunctories when their passage by the kidney was interfered with. The passage of a urinous fluid from the skin has been observed in cases where the renal secretion was scanty; and the critical sweats, by which attacks of gout sometimes terminate, contain urates and phosphates, in such abundance as to form a powdery deposit on the surface. It has been ascertained that in warm climates urea is an element of perspiration even of healthy persons. At other times a urinous fluid is cast out by the gastro-intestinal canal, which possesses an excretory as well as an absorbent action. As excretory organs these involutions of skin, and their primitive form the tegument, possess much in common.

§ 26. Along the gastro-intestinal canal there are established a series of excrementitious actions, resulting in the production of numerous albuminous products which are also recrementitious, and are very useful in the elaboration of our food. Though varied they possess much action in common. That is, along the digestive tract, the primitive tegument has undergone such modifications as to excrete, or secrete, a series of products which fulfil no unimportant function in assimilation. And yet these excretory organs give off other products when the system is charged with them; products too far advanced to possess any nutritive power, and simply active poisons. From the times of Chirac and Helvetius, who noticed that a urinous fluid was passed off from the stomach after ligature of the ureters, down to the present day, this power on the part of the gastro-intestinal canal to supplement the action of the other excretory

organs, has been observed and acknowledged. In the same way, the biliary excretion is removed by different parts of the body (not usually eliminating bile) when the system is charged with it. The skin, the serous membranes, the mucous membranes, are often penetrated with the colouring matter of bile, which they have withdrawn from the blood. The urine is often so charged with bile as not only to give bile reactions in testing, but even to stain the linen; while bile-stained tube-casts are among the most striking objects revealed to us by the microscope. The elimination of the catamenial flow by other organs than the lining membrane of the uterus, furnishing what is called vicarious menstruation, is a phenomenon to which portentous importance is attached by many savage tribes. Even milk has been found to procure an exit by other channels than the mammary gland-ducts.

The relations of excretion to nutrition are much involved. We have seen how a great many products are excreted, and yet not cast out, but fulfil an important functional end. Unexcreted they might have been injurious; excreted they are useful and beneficial. But there is something more than this in their relations. As was first pointed out by Treviranus, "each single part of the body, in respect of its nutrition, stands to the whole body in the relation of an excreted substance;" in other words, every part of the body, by taking from the blood the peculiar substance which it needs for its own nutrition, does thereby act as an excretory organ; inasmuch as it removes from the blood that which, if retained in it, would be injurious to the rest of the body. Thus the phosphates which are deposited in our bones are as effectually excreted from the blood, and prevented from acting injuriously on the other tissues, as are those which are discharged in the urine. The effect of each act of tissue-formation is to remove that which if unremoved, would, or at least might, have exercised an injurious influence; and which, if accumulated, certainly would exert a prejudicial action. What is requisite for one part is injurious to another. It is somewhat difficult to realize this fact fully, in an organism so complex and so interpenetrated, as the body is, by blood-vessels and lymphatics. At first sight it would seem that every form of pabulum must be carried to every tissue; just as small

organisms are seen to melt in the jelly-speck—the amœba—a simple solution of the tiny creatures being set up; and a centrifugal distribution of the solution throughout the mass of sarcode, carries it at last, as waste, to the external excretory surface. But nutrition has become a complex matter as evolution has progressed; and the development of the different specialized areas, with their varied functions, is not more compound than is the general nutrition, which gives to one tissue as food, what would but be poison to other tissues if not removed.

§ 27. And yet, through all this, there remains, in each and every excretory organ, a sufficient amount of its primitive character to render one organ a compensatory excretory agent for the elimination of what is more distinctly the province of another organ. Consequently we get compensatory over-actions, which are often mistaken for disease. Indeed until physiological research came to illuminate our practice, such a thing as uræmic diarrhœa was unthought of; and as a consequence its proper treatment remained undevised. We had simply no conceptions of any augmented secretions or excretions, other than as morbid actions. In this respect we have made great advances; and now we commonly recognize the secondary character of what is truly a compensatory action, and not a morbid process. Especially have we learnt this lesson in regard to the recurring ailments of advanced life.

In early life most ailments take their origin in imperfect nutrition—in failure in the nutritive processes; in advanced life, ailments usually arise from impaired elimination of waste products. Zymotic, and accidentally-acquired diseases act alike in both extremes of life.

Many valuable lessons in practice are to be learnt solely from physiology, and it is only now becoming possible to learn them. It is only at the present time that we are in a position to admit of an intelligent and rational comprehension of much of the ill-health of matured existence. Although the number and variety of secretions become greater in proportion to the increased complexity of the nutritive processes in the higher classes, and although each appears as if it could be formed by its own organ alone, yet we may observe, even in the highest animals, some

traces of the community of function which characterizes the general surface of the lowest. It has been shown that, although the products of secretion are so different, the elementary structure of all glands is the same; that wherever there is a free excreting surface it may be regarded as an extension of the general envelope of the body, or of the reflexion of it which lines the digestive cavity; that its epithelium is continuous with the epidermis of the integument, or with the epithelium of the mucous membrane from which it is prolonged; and that the peculiar principles of the secreted products pre-exist in the blood in a form at least closely allied to that which they assume after their separation. It may be laid down as a general law that in cases where the different functions are highly specialized, the general structure retains, more or less, the primitive community of function which characterized it in the lowest grade of development. Although the functions of absorption and respiration have special organs provided for them in the higher animals, they are not altogether restricted to these, but may be performed in part by the general surface, which permits the passage of fluid into the interior of the system, and allows the interchange of gases between the blood and the air. In the same manner we find that the functions of secretion are equally performed in the lowest animals by the whole surface, whilst in the highest there is a complicated apparatus of glandular organs, to each of which some special division of the function is assigned; either the general muco-cutaneous surface, or some one of its subdivisions or prolongations, is able to take on in some degree the function of another gland whose functions may be suspended. It is probable that almost all secretions may, under the influence of disease, be formed by each and every organ. This statement, however, needs to be received with some limitation, and it would probably be safest to restrict it to the excretions whose elements pre-exist in the blood, and accumulate there, when the elimination of them by their natural channel is suspended. This introduction to the physiology of excretion will enable us, all the better, to take up the subject of its abnormalities, and to see more clearly the indications for a rational treatment.

§ 28. Thus, for instance, we see how water is eliminated from

the system by the different emunctories, the skin, kidneys, lungs, and bowels. When the skin is very active the bulk of urine is small; and a similar decrease in the amount of water excreted by the kidneys, follows a sharp diarrhœa with watery motions. Sometimes when the action of the skin is checked while the kidneys are acutely congested, a condition often produced by exposure, we see a general œdema induced, a storage of the water in the areolar tissue, only to be removed by sweating and purging.

Carbonic acid is chiefly exhaled by the lungs, but a portion also escapes by the skin. Under certain circumstances of arrest in the action of the lungs, the amount passed off by the skin becomes notably increased. Holding the breath in summer quickly induces perspiration in many persons. In fact when the exhalation of carbonic acid by the lungs is interfered with the skin passes it off. It has been observed not unfrequently that the livid tint of the skin which supervenes in asphyxia, owing to the non-arterialization of the blood in the lungs, has given place after death to the fresh hue of health owing to the reddening of the blood in the cutaneous capillaries, by the action of the atmosphere upon them; and it does not seem improbable that, in cases of obstruction to the due action of the lungs, the exhalation of carbonic acid through the skin may undergo a considerable increase; for we find a similar disposition to vicarious action in other parts of the excreting apparatus. There is also evidence that the interchange of gases between the air and the blood through the skin has an important share in keeping up the temperature of the body: and we find the temperature of the surface much elevated in many cases of pneumonia, phthisis, &c., in which the lungs seem to perform their function very insufficiently. Every practitioner will agree with this, as he must have had opportunities of noting this fact about the consumptive patient when far on his journey. About 5 or 6 A.M. the patient will usually do one of two things: either waken up and beg for air, sitting gasping, from the diminished lung space, and throwing into play all the auxiliary muscles of respiration—breathing for dear life indeed; or he falls into a deep comatose sleep, and becomes drenched with perspiration. Sometimes one happens.

sometimes the other. In each case there is a desperate effort made to get rid of the carbonic acid of the system. In some of the lower animals the cutaneous respiration is an important matter.

Even still more important, and withal interesting, is the subject of the elimination of nitrogen. It is usually taken for granted that nitrogenized waste passes off by the kidneys only. Few practitioners think of the other means of its exit, in their practice and treatment. The importance of renal inadequacy is being now very generally comprehended, and a short review of the matter may be profitable. Prevost and Dumas were the first to find that when urea was not cast out by the kidneys it accumulated in the system. Since then we know that urea, uric acid, and the earlier products of histolysis, creatine and creatinine, are all to be found in the blood after ligature of the renal artery. Such being the case, these waste matters pass out by different emunctories.

Suppression of urine may be the consequence of many different pathological conditions. If this lasts long a train of symptoms appears which are usually grouped under the name of uræmia, and of which convulsions may be one of the most prominent. Stewart, in his well-known *Manual of Physiology*, records a case in the human subject which in effect though not in intention belongs to the domain of experimental physiology. He says:—"A surgeon diagnosed a floating kidney in a woman. With a natural impatience of loose odds and ends of this sort, he offered to remove it, and in an evil hour the patient consented. The surgeon, a perfectly skilful man, who acted for the best, and to whom no blame whatever attached, carried the kidney to a well-known pathologist for examination. The latter, to the horror of the operator, suggested from the appearance of the organ that it was the only kidney the woman possessed. This turned out to be the fact. Not a drop of urine was passed. Apart from this ominous symptom all went well for seven or eight days; but then uræmic troubles came on, and the patient died on the eleventh or thirteenth day after the operation. The autopsy showed that her only kidney had been taken away."

Schottin discovered urea in the sweat of patients suffering

from the collapse of cholera. Not only has the discovery of Schottin been confirmed by the researches of Rees, of Fiedler and Jürgensen, and of Leube, but it has also been abundantly proven that the skin excretes urea freely during the advanced stages of Bright's disease, and also during the partial suppression of urine of scarlatinal desquamation and nephritis. The urea in renal disease may even form a distinct crystalline powder on the skin; but it is most abundant about the mouths of the sweat-glands. By a series of elaborate experiments Leube has rendered it probable, if he has not actually proven, that in health there is such a relation between the skin and the kidneys that when the former is very active the latter excrete less than the normal amount of urea.

From this it would appear that suppressed gout may arise from defective action of the skin as well as from renal inadequacy. Richardson found that ammonia was given off by the breath in uræmic coma, and experience has made it a common observation.

Zalesky found in serpents, after ligature of the ureters, that all the organs and tissues were strongly infiltrated with urates, which formed thick white crusts and patches on all the mucous and serous membranes, in the joints, in and upon the kidneys, liver, heart, and spleen. By chemical analysis uric acid was also abundantly found in the lungs, muscles, and throughout the body. When the vomiting is really uræmic it takes place without reference to the nature of the contents of the stomach, and is oft repeated or uncontrollable; the vomited matter is a watery fluid, either distinctly ammoniacal to the smell, or (if acid) evolving ammonia when caustic potash is added thereto. The alvine dejections are similarly characterized when due to the same cause, with the inflammations of serous membranes so commonly found in chronic Bright's disease.

Thus we can see how a whole array of so-called ailments may arise in consequence of imperfect elimination of nitrogenized waste; and that such, of course, will most commonly occur where the kidneys are no longer in their integrity. But these affections are not the disease itself. They are forms of natural cure. They are better obviated, if possible. If this is not feasible, they may be aided by proper treatment. A large

series of the affections of advanced life find their origin in impaired elimination of nitrogenized waste. They are compensatory actions rather than diseases *per se*.

§ 29. It is obvious that in the treatment of affections originating in the imperfect elimination of nitrogenized waste, there are several points to be attended to. 1. To reduce the amount of nitrogen consumed. This needs no explanation. 2. To give large quantities of fluids, in order to bathe the tissues, and wash away the sparingly soluble salts. 3. On no account to attempt to stop the compensatory excretory action, until the normal excretion is restored. 4. To act upon the different compensating organs, and set up vicarious elimination through other channels. For this last purpose, action upon the skin is at once the most physiologically rational, and at the same time practically feasible. In all cases, then, the skin may be kept in action with advantage. Warm baths, Turkish baths, the hot-air bath, all may be resorted to beneficially. When the stomach is unaffected, large draughts of water, pure or alkaline, are indicated. Such draughts may advantageously be used to wash down the following dose:—

Pot. Iod. gr. v.
Pot. Bicarb. gr. x.
Inf. Buchu, ℥i. om. 4tâ horâ.

At the same time, if there be evidence of congestion of the kidneys, hot sinapisms may be applied over the loins, or dry cupping may be resorted to. The bowels may be smartly acted upon by drachm doses of compound jalap powder, or the following:—

Pulv. Gambogiæ, gr. v.
Pot. Bitart. ℥ij.
Pulv. Pip. Nig. gr. x.

daily, followed by action on the skin and draughts of water. Such a plan of treatment must be pursued intelligently and courageously; and if followed out will often give very satisfactory results. When the plan of treatment is decided upon, it is not well to interfere with it to allow for some intercurrent

trouble, unless the new trouble imperatively demand attention. Affections demanding such a plan of treatment are much more common among elderly people than is ordinarily supposed.

Even after the violence of the outburst is quelled, it is very important to remember the pathology of the morbid condition, and to avoid vegetable astringents, and still more opium. This last except in very small doses is a desperate poison in conditions of impaired elimination, and must be scrupulously avoided. If the diarrhœa persists after the action of the kidneys is fairly re-established, the skin must be kept in action, and the following mixture may be prescribed:—

Liq. Ferri Pernit. ℥xv.
Potassii Nitrat. gr. v.
Inf. Buchu, ℥i. ter in die.

It is a matter of much importance in the treatment of such cases to put the patient on a slop diet, which contains a minimum of nitrogen. The error made by our predecessors, in their adoption of a slop diet, was, that they applied it too exclusively; and did not, with sufficient care, discriminate betwixt the cases where such a diet was indicated, and those where a more liberal dietary was desirable, and even imperatively necessary.

For some time, indeed, after any outburst associated with impaired elimination, the patient must live very carefully. The diet must be largely farinaceous, the skin be kept well clad in flannel, and the bowels regulated with alkaline purgatives. The pathology of the ailment shadows out the true and rational treatment.

§ 30. It not unfrequently happens that organs actively engaged in compensatory action, or vicarious elimination become themselves affected from this functional activity. Thus in chronic renal changes it is very common for the skin to become chronically diseased; and the skin affections, so induced, are very intractable if their origin be not remembered. Numerous chronic skin affections, eczematous and scaly, are cured, for the time being, by a course of Aix-les-Bains, Buxton, or other waters. The elimination of the waste products, by the action of the alkalies dissolving them, and so permitting of their washing out through the different water-channels of the body, is followed by

the cure or relief of the affections, induced by the vicarious functional activity of the skin. But they return again, usually in a brief period, unless the drinking of some alkaline water is continued.

Piperazine or "Synthetic Spermine," as it is sometimes called, has of late been largely employed as a solvent of uric acid. It is said to dissolve twelve times as much uric acid as lithium carbonate. It is usually given in five grain doses in a tumblerful of effervescing water. It is still on its trial, and although some authorities speak highly of it, others are inclined to think that it has no advantage over the older remedies.

When there is a gouty diathesis the following mixture often proves useful :—

Pot. Iod. gr. v.
Pot. Bicarb. gr. x.
Tinct. Sem. Colch. ℥x.
Inf. Buchu, ad ℥i.

To be given three times a day.

As a rule colchicum wine is a more reliable preparation than the tincture. The iodides are of great value in the treatment of gout. Patients who find that iodide of potassium depresses them, should take iodide of sodium. The iodine combines with the lead and the sodium with the uric acid. Most people can take five grains of iodide of sodium and ten minims of colchicum wine three times a day without inconvenience.

Not only the skin, but the bronchial membrane is apt to become chronically deranged from vicarious action; and in these cases iodide of potassium, &c., is extremely useful. Indeed, these are the cases of bronchitis which yield to this remedial agent only. In many cases the stomach seems to suffer continually from the irritant effects of the uric acid present in the gastric juice. It may be merely a coincidence, but it has occurred to us, several times, to see cancer of the stomach developed after a long history of gouty dyspepsia. It is quite possible that the irritation, so caused, ultimately leads to a development of pathological connective tissue of a grave character, viz. scirrhus.

It may be as well to draw attention to the relations of localized inflammations with general conditions of imperfectly depurated blood. Irritation and inflammation are sometimes caused by excrementitious matter retained in the blood, where the functions of the excrement organs are impaired. The natural excretions of the body become acrid irritants when brought into contact with serous membranes; thus urine, fæces, and bile, effused in serous membranes, even in the smallest quantities, produce intense irritation and inflammation.

Such being the case, it is quite possible that long-continued irritation, by trifling quantities of these substances, may result in tissue changes of a chronic character; and, in those advanced in life, such change may assume the direction of malignant connective tissue.

§ 31. Another important effect of impaired excretion is the action of retained excreta upon the blood-formation. These poisons—for they are identical in their effects with blood poisons—so produced within the system itself, act in the most prejudicial manner upon the formation of the blood, or, if not that, they break the blood down when made. It is quite common to see cases of what may be denominated "fæcal anæmia"—that is, anæmia caused by the action of the excretions of the intestinal canal being again absorbed, during persistent constipation, and exercising a destructive action over the blood corpuscles. Purgation at once improves this state of matters, and the condition of anæmia is relieved ere chalybeates are resorted to. In the same way we find the anæmia, so common in the course of kidney disease, to be produced. The presence of renal derivatives in excess affects the red blood corpuscles in reducing their number. Anæmia follows, and iron, alone, will not relieve the condition. As in fæcal anæmia, iron will not increase blood-formation unless a specific be added to it. Purgatives in all cases aid the action of iron, and this is the explanation of much of the benefit derived from such combination. In gouty anæmia, potash added to iron, and the dose washed down by large draughts of water, produces at once a pleasant change in the state of matters. Such a combination is furnished by the Compound Iron Mixture. It is perhaps better to combine iron with potassium thus:—

Pot. Bicarb. gr. x.
Ferri et Ammon. Cit. gr. v.
Inf. Quassiæ, ʒi. ter in die,

gradually decreasing the potash and increasing the iron, until a good state of health is produced. It has fallen to our lot to see gouty anæmia pass away, and the hue of health come back to the lips and cheeks, simply under the use of potash and diuretics, before a single grain of iron had been administered. In this respect anæmiæ, the result of systemic poisons, resemble the anæmiæ of syphilis, of lead-poisoning, and of malarial disease. In each case the specific, mercury, iodide of potassium, or quinine, must be added to the chalybeate, ere good blood construction can be induced. Promoting the action of the skin is often useful in bringing the system under the influence of iron in these cases. This is brought about by its eliminant action. Warm baths and purgatives are serviceable as adjuncts to the hæmatic remedies in such cases. Thus mercury, iodide of potassium, or quinine act as hæmatics in these cases, because they directly aid in inducing healthy blood-formation.

In many cases of anæmia the ordinary methods of giving good food and iron totally fail. The treatment is persevered with, but is of no avail. The blood-formation is prevented by some poisonous material in the blood, and all our efforts are futile. When the specific remedy is administered then progress is made, and the case goes forward. When anæmia is a consequence of impaired elimination of nitrogenized waste, a spare diet, but poorly supplied with nitrogen, will often produce excellent effects, and procure an improved blood-formation. Such a plan of treatment would never suggest itself except under two sets of circumstances. 1. A good comprehension of the physiology and pathology of assimilation. 2. A close and observant experience, which can guide the treatment of one case from its remembrance of the course of events in another. Few are equal to the latter; the former is easily possible. Such a plan of restricted diet must always precede any restorative treatment, in cases of inadequate excretion. However the patient may dislike it—and some do rebel in earnest—it is the only plan. We might wish to reap our corn as soon as the ear

is shot—and the folly of that is clearly apparent—without satisfactory results: so sometimes patients wish to hasten processes, instead of allowing them their proper order; and the folly becomes apparent in time. The old trainers' plan of clearing out the system, ere commencing to build it up, was sound and sensible.

§ 32. There is another product which in its waste or excess is certainly an excretion, and that is bile. Though the creation of the liver essentially, when the flow through the gall-duct is obstructed, there is a general saturation of the body with bile products. The different involutions of the general primitive tegument are specially involved, as vicarious and compensating eliminants. Bile may either not be secreted originally, if indeed this occurs at all, or it may be reabsorbed: the latter being infinitely more common. Biliousness usually springs from the reabsorption of spare bile going round and round in the portal circulation. In either case, the urinary apparatus is the principal channel through which the biliary matter is eliminated, the urine becomes tinged with the colouring principle of bile, being sometimes of a yellowish or orange hue, and sometimes of a brown colour with a considerable sediment; and the presence of the most characteristic constituents of the bile may be determined in the urine. The same result presents itself when the biliary duct has been artificially obstructed by ligature. Other secretions have been found tinged with the colouring matter of bile: thus the pancreatic fluid has been seen of a yellow colour in jaundice; and the milk has presented not merely the hue, but the characteristic bitterness of the biliary secretion. The cutaneous transpiration is not unfrequently so much impregnated with biliary matter as to communicate the tinge to the linen covering the skin; and even the sputa of patients have been observed to be similarly coloured, and have been found to contain biliary matter. The secretions of serous membranes, also, have frequently been seen to present the characteristic hue of bile; and biliary matter has been detected, by analysis, in the fluid of the pleural and peritoneal cavities.

We are familiar with disturbances wrought in the system by the excess of a normal product, viz. lactic acid. It is a normal recrementitious excretion in the gastric juice, and it

normally exists in the parenchymatous juices, and especially in that of muscle. It is found in excess in those whose diet is too exclusively farinaceous. It is formed in great excess by the organism in acute rheumatism, or rheumatic fever. Indeed rheumatic fever has been induced by doses of lactic acid given medicinally. In acute rheumatism the skin is bathed in a sour perspiration, the saliva is usually sour, the intestinal canal pours out sour and offensive fæces, and the urine is acid and charged with lithates. As the patient recovers the secretions become normal. This again shows how under certain circumstances general excretory activity is induced, with the effect of cleansing the system from a normal product when in excess. We act upon the excretions in the treatment of rheumatism, as we shall see when we come to take up the question of rheumatism.

§ 33. *Alteratives.*—There are employed to affect certain diseases intimately connected with the processes of nutrition, various substances which do not, at least in the doses commonly employed, produce any very obvious symptoms. These drugs may perhaps neither stimulate nor depress, so far as can be perceived, any function of the body; their action may be silent and imperceptible, their mode of influence may be unknown, but their therapeutic effects are among the most assured of clinical facts. It is to medicines of this character that the name of "Alteratives" has been applied, because when administered they seem simply to alter morbid processes.

Our inability as yet, to explain the action of alteratives by exact physiological experiment, is the less unfortunate that the clinical facts so well support what empiricism has taught us. It must not for one moment be supposed that all empirical facts which physiology or pathology cannot yet explain, are to be rejected accordingly. What will become of all which we trust to learn, if we are to cast away everything not yet illumined? We should be cutting ourselves off from some most valuable knowledge if we were to abandon the teachings of empiricism. It is certainly much more satisfactory to be able, by the light of physiological research, to elucidate what empiricism has demonstrated to be a fact. But where this cannot, as yet, be done, we must acknowledge the facts, and

in doing so perhaps pave the way for forthcoming investigations, which may tend to clear up our imperfect knowledge. To deny the existence or value of medicines of this class because we cannot tell why mercury relieves syphilis, or why iodide of potassium cures rheumatism, is as absurd as to deny the existence of the syphilitic or rheumatic dyscrasia, because we do not know their ultimate nature.

Arsenic is a powerful alterative. As an alterative it is found to be eliminated by the kidneys chiefly, then by the intestinal canal, by the skin, and even by the saliva and tears. Thus we see that it is eliminated by the principal excretory organs, and can understand its efficacy in procuring more perfect elimination of waste, and so more perfect nutrition of the body. The improved elimination leads to a more thoroughly healthy state of the secretions and excretions. Arsenic is used in some countries, especially Styria, to give robust health. This it does, and endows the arsenic-eater with ruddy cheeks, the bloom of health, long wind, and a good physique generally. It has been used in other countries for its famous alterative qualities, as a cosmetique, for both human beings and horses. There is very little doubt that certain preparations of arsenic are largely employed in this country as "Pick-Me-Ups." In more than one suspected case of poisoning, the presence of the drug in the liver and other organs of the body has been attributed to its habitual use by the victim as a tonic. This and the doubt which exists in the minds of many unprejudiced observers as to the accuracy of the tests usually employed for the quantitative estimation of this poison, makes it difficult to ensure a conviction on purely technical grounds. For medicinal purposes arsenious acid may be added to hæmatic and tonic remedies with advantage.

℞ Fowler's Sol. ♏v.
Pot. Bicarb. gr. v.
Fer. Pot. Tart. gr. v.
Inf. Quassiæ, ℥i. ter in die,

before food is often a capital combination.

Sometimes it is desirable to give arsenic in an acid solution with iron, as—

Valangin's Sol. (Liq. Ars. Hyd. Chlor.) ℥iii.
Tinct. Fer. Perchlor. ℥x. ter in die,

in water, or other vehicle, after food. This is the best fluid form of arsenic to be given with hæmatics, when wishing to build up the blood and system generally. Or it may be administered in the form of a pilule containing one thirty-second of a grain in each. It is often very convenient to use the terms "Fowler's solution" and "Valangin's solution" when nervous patients would be alarmed to see arsenic in their prescription. As a rule arsenious acid should be given after meals, but when the dose is small, say, one-hundredth of a grain, a much more prompt action may be obtained by giving it before meals.

Mercury is a notable alterative. It is found in all excretions. It acts upon the flow of bile, it is found in the urine, in the serum of ulcers, in the saliva, fæces, and even in the seminal fluid. It has marked action on the skin. Its value is generally recognized, not merely as an antisyphilitic and antipyretic, but as an alterative. When the tongue is foul, the skin dry, the bowels loaded, and there is a bitter taste in the mouth in the morning, calomel will almost at once make a difference in the effects of purgation. Purgatives may have been resorted to in vain, but mercury produces a decided difference. As an occasional purgative it is most useful, but its severe after-effects render its long continuance undesirable except in syphilitic cases. The soluble preparations, as the bichloride and the iodide, are most powerful poisons, and must be given in small doses. Headland thinks that calomel, blue pill, and others are rendered soluble—without which they would be physiologically inert—in the gastric juice, or the alkaline chlorides of bile.

Mercury may be given in powder, pill, mixture, or by a plaster. It can often be combined with iron with advantage, especially in the anæmia of syphilis, whether acquired or congenital, where it is most useful.

Iodine is a powerful alterative. It passes off chiefly by the kidneys, but is found in the secretions of all mucous membranes. It may be tasted in the mouth after its local application to the knees. As iodide of potassium it is one of our commonest

and most valued remedies. Its alterative action on the different emunctories, and especially in getting uric acid out of the system as well as the poison of syphilis, renders its use very common.

"The iodides, when taken into the stomach, are very rapidly absorbed. It is probable that in the blood all iodides form combinations with common salt, and act as iodide of sodium. It is possible, however, that the iodine may be set free, and may enter into combination with albuminous substances. This may throw some light on its mode of action in promoting the absorption of gummatous and other growths. The entrance of a molecule of iodine into the composition of the albuminous material may favour its metamorphosis and disintegration. Lead and mercury are set free from the tissues by iodine, and are rapidly eliminated. It is said that the iodides sometimes cause salivation, but this is only indirectly true. They give rise to salivation only in those who have previously taken mercury. The mercury has been deposited in the form of an albuminate, and on the administration of an iodide it is brought once more into the circulation, and produces its constitutional effects" (Murrell, *Pharmacology and Therapeutics*).

The iodides are eliminated by the kidneys, and may be detected in the urine a few minutes after a dose has been taken. The iodine has been detected in the blood, the saliva, the urine of sucking children, and in most of the secretions. Probably some of the iodine is eliminated by the skin, and causes the rash. A popular method of demonstrating the presence of iodine in the saliva is to put a bright shilling in the mouth for a few minutes, when it rapidly becomes discoloured.

The most powerful alterative known is the combination of iodine, mercury, and arsenic, called Donovan's solution. In all cases where the excretory organs, at large, need acting upon, this is a capital agent to employ.

℞ Donovan's Solut. ℥xx.
Inf. Cascarillæ, ℥ss. ter in die,

is a famous alterative, especially in tertiary or congenital

syphilis. Alteratives are commonly and advantageously combined with purgatives; and often a liberal dietary becomes necessary at the same time that they are continued, especially if there be much wasting. Colchicum, sarsaparilla, and guaiacum are vegetable alteratives often used along with iodide of potassium. Guaiacum is a better vehicle and adjuvant than sarsaparilla in most cases, especially in the rheumatic.

§ 34. The well-directed use of alteratives will often give the most gratifying results. Indeed they are a class of agents too little understood by the merely well-taught hospital student; but with which he will do well to make himself more familiar, if he desires success in private practice. Their effect not being explicable or demonstrable by actual experiment, they are too often neglected, to the injury both of medical man and patient. They were much more used by the practitioners of the last generation than they are now. Their neglect is one of the surest pieces of evidence that while our profession as a science has distinctly improved, in some respects it has retrograded as an art. There really is no room for doubt but that the brief mercurial course—not to the extent of salivation, but a few grains of Plummer's pill every night for four or five nights—so commonly resorted to by the practitioners of the past, was often salutary. Such means threw into action the different emunctories of the body, and so restored the blood to a normal condition. In the treatment of affections of the skin, so notoriously associated with imperfect elimination, or the formation of crude matters by imperfect assimilation, these alteratives are chiefly relied upon for the cure of many of the most obstinate of these decidedly intractable diseases. Of old it was quite common to fall back on a course of alteratives when any affection was more than ordinarily rebellious; and now we resort to the same thing whenever there exists a suspicion of syphilis. But it is somewhat irrational to assume that the poison of syphilis—be it what it may—is the only one eliminated by agents acting generally upon the excretory organs. There are systems, about which experience alone can give much information, where alteratives are distinctly indicated; people with muddy complexions, unctuous skins, a disagreeable odour in the breath, and generally constipated bowels. Such persons are all the better of a course

of alteratives and purgatives, from time to time, when out of sorts.

It was a practice among the practitioners of the past to give a dose of calomel and James's powder at bed-time, with a Seidlitz powder in the morning, to patients who presented themselves with severe colds. Here the tongue was usually foul and the skin dry, with some thirst. After the bowels had been freely opened, acetate of ammonia with ipecacuanha wine, as diaphoretics, were given for a day or two.

No doubt habits of cleanliness, better ventilated bedrooms, systematic exercise, more regulation of the bowels, and a systematic attention to the general health, have altered matters much; and that the appeal to the general excretory organs, once so necessary, is not now so strictly indicated among the more affluent classes; but among the humbler classes the old plan of commencing treatment is a sound one.

So, too, in convalescence, the occasional use of alteratives is proper and beneficial. It often happens that a steadily progressing recovery is suddenly clouded by a state of feverishness, a foul tongue, loss of appetite, and general *malaise*. Under these circumstances it is a good plan to give a calomel and colocynth pill at bed-time and some citrate of magnesia in the morning; or to give a few grains of calomel with jalap or scammony in the morning, if the patient be seen in the forenoon. A gentle action on the bowels generally restores the condition to what is to be desired. But it must not thence be conjectured that it is the mere purgative action which is the whole matter; like results will not happen if the mercurial be omitted.

The alterative action of arsenic is well illustrated in the excellent effects produced by its combination with iron. In many cases of impaired health, where the hair has lost its gloss, the skin is dry and harsh, the tongue always furred, and the assimilative process is imperfect, a course of arsenic and iron restores the lost lustre to the hair, the skin recovers its pliability and softness, the tongue cleans, digestion and assimilation progress, the system gathers weight, and the person possesses once more the characteristics of health. In cases where there has been mischief in the lung, as for instance where an acute attack of pneumonia has degenerated into tubercle, or incipient tuber-

culosis exists, then the combination of arsenic with iron, and a liberal dietary, seems specially valuable, and gives most gratifying results.

The combination of iodine with iron, as in the syrup, has been found useful in the treatment of the strumous, and especially strumous children. Whether it is in the convalescence after some exanthem, or in imperfect growth with defective assimilation, the union of iodine with the chalybeate is usually adopted as a matter of course—as a consequence of experience merely, without any investigation into the *rationale* of the matter. In fact it is done as a matter of habit, as a consequence of what has been observed and silently registered—the outcome, indeed, of experience.

Neither is it difficult, after the physiological introduction to this chapter, to comprehend why a generally improved excretion should exercise such a beneficial action upon assimilation. Waste must be removed ere new material can be deposited in a tissue; and waste products must be efficiently eliminated, if the assimilative processes are to be carried on with normal efficiency. This truth has found an expression in the wonderful growth of the system of treatment commonly known as hydropathy. In the treatment of the ailments of mature life, especially of the man who has kept himself up to his work by large supplies of rich food and a liberal amount of alcohol, and in whom the system is saturated with the products of waste, the plan of taking liberal draughts of water is excellent. The waste products of the body are soluble, if but sparingly soluble in water; and the bathing of the tissues with water, and the washing out of the system, are applications of sound physiology. By this means, by the powerful alterative action of water in unstinted quantities, the aim of purifying the organism, by exciting its different emunctories into high functional activity, is achieved. To this should be conjoined an almost total abstinence from alcohol—the only beverage is water. The food should be simple, and not too specially inviting, there should be nothing in it to tempt over-indulgence. There should be good food for the needs of the organism; plenty of fresh air, with its waste-removing oxygen; many hours every day out of doors in bracing air; and finally, early hours to bed, and an early hour to rise in the morning.

We are rapidly coming round to a point when the importance of proper, sufficient, and healthy excretion, in the maintenance of health and the treatment of disease, can be established by scientific evidence, as well as by the accumulated but undigested facts of simple empiricism. As a logical sequence, then, alteratives are again being included in our armamentarium with benefit to our patients.

CHAPTER IV

BODY-HEAT AND FEVER

§ 35. WHETHER under the burning sun of the Sahara, or on an iceberg in Davis's Straits, the body-temperature of man is practically the same. There may be sometimes a slight difference, but it is only to be measured by tenths of a degree Fahrenheit, or little more. To a certain extent this result is due to clothes; and without warm clothing, by which the body-heat may be conserved, man could not maintain a temperature compatible with life in the Arctic regions. But admitting that clothes are an indispensable auxiliary in cold climates, this body-heat is maintained in the one case, and regulated in the other by most important processes going on within the organism.

All our heat is the result of combustion, of oxidation of the material consumed as food. At one time it was thought this combustion was carried on in the lungs solely—that they were the furnaces of the body. We now know that oxidation goes on in all the minute capillaries of the body. But the combustion is much more active in some parts than in others. The chief combustion goes on in the muscles. The actual combustion is said to consist chiefly of the oxidation of lactic acid in union with soda. The hydro-carbons are stored up, for the time being, in the liver as glycogen, which, when liberated, becomes sugar, and is then split up into lactic acid, and as such is oxidized. The muscles have each a little store of glycogen, but the great store-house is the liver. The more permanent storage is in the form of fat; and on these stores of fuel the body lives when deprived of food. As the reserves of glycogen become exhausted

the fat is utilized to sustain the body-temperature. This temperature is almost entirely maintained by the union of oxygen with the carbon and hydrogen of our food. To a small extent nitrogenized matters are oxidizable, and so furnish a small quota of heat. A certain combustion goes on in the viscera, and the venous blood of the kidneys and liver is warmer than the arterial blood supplied to these organs. The blood of the inferior vena cava is warmer than that of the superior vena cava, and even than arterial blood itself. A greater amount of heat is produced during the action of muscles than when the same muscles are inactive. It makes a decided difference, however, whether the muscular action is doing so much work, or whether it is not so employed, as to the amount of heat produced. In tetanus very high temperatures are reached. In ordinary muscular action a certain amount of what would otherwise be heat goes to produce mechanical results; and there are good grounds for holding that the products of muscular contraction —*i. e.* the heat and the mechanical results—are conjointly the expression or equivalent of the chemical action which goes on in the muscle. Heat is also furnished by mental exertion; this is more remarked in tropical climates than in cold ones. Active mental exertion produces a rise of temperature of from one-half to a degree Fahrenheit. A large supply of good food also occasions a temporary rise of temperature, probably from the increased heat produced by the active changes of digestion and assimilation.

On the other hand, heat is lost chiefly by the skin; and to a less extent by the respiratory tract. The blood circulating through the skin is cooled by heat-loss, by the radiation away of the heat in the surrounding cooler air. The larger the amount of blood circulating through the cutaneous vessels the greater the heat-loss. In cold weather, the skin is cold and marbly; it is also white and anæmic. The vessels are contracted, and the heat-loss reduced to a minimum. On the contrary, when there is an excessive heat-production, the vessels of the skin dilate; the skin is high-coloured and glowing; it is in a highly vascular condition. We have seen that a free blood supply leads to functional activity, and if the heat-production be maintained, we get the sudoriparous glands thrown into action, and

perspiration ensues. The consequence is that the cooling effects of evaporation are called into play, and still further heat-loss is occasioned. The evaporation of water produces much coolness, from the amount of heat rendered latent, as water assumes a gaseous form. By such means the temperature is kept at or near the normal. In tetanus, and in rheumatic fever, there is free perspiration often found along with very high temperatures; but all that this proves is that the evaporation and heat-loss are unequal to neutralizing the excessive heat-production. The body-temperature often rises after death, and continues high for some hours. This is due to the fact that the heat-production is no longer met by heat-loss, by radiation of heat away by blood-current through the skin. The play backwards and forwards betwixt the production of heat and its loss is not only very interesting, but is of the highest practical importance. No precise measurements exist of the quantity of moisture (aqueous vapour) discharged by the human skin in health, and consequently no estimate can be formed of the heat normally lost in this way. In the Turkish bath the loss of water often amounts to 500 to 600 grammes per hour. If this weight of water were entirely converted into vapour it would imply a loss of heat amounting to some 300 to 360 k.-units, which (supposing the specific heat of the body to be nearly equal to that of water) would cool it 6° or 7°. In fever the quantity of liquid sweated can never or very rarely be comparable to that discharged in the Turkish bath, but even here, if it were completely converted into vapour the heat-loss would be very rapid.

Rosenthal has divided the body into an internal, or heat-producing area, and an external, or heat-losing area, with a mixed, or intermediate plane betwixt them. In the internal area heat is being produced by combustion; in the outer area it is being lost, or got rid of. Now it is obvious that a great effect must be produced by the amount of blood circulating in these two opposite areas. If the vessels of the skin be contracted by the action of external cold, then the amount of blood circulating in the cutaneous vessels will be small, and the heat-loss will also be small. Further, if there be but little blood circulating through the outer area, there must be more

circulating in the internal or heat-producing area, and consequently greater heat-production. The combined effect of this is increased heat-production and diminished heat-loss in cold climates; and so the body preserves its normal temperature in the coldest regions—aided, as we have before said, by the action of clothes.

In hot countries this process is reversed. There is in a surrounding medium of high temperature, a fulness or dilatation of the vessels of the skin. By this means the heat-loss is brought to a maximum, and heat-production to a minimum. The lesser the amount of blood in the internal, or heat-producing area, the less heat is evolved; there is a lessened heat-production, and very little oxidation or wasting. Under these circumstances life can be maintained on a very small amount of food, as evidenced by the long fast of the crew of the *Arracan* in the Indian Ocean, from which all recovered, after fifteen days of short commons, and then seventeen of almost absolute fast. In a cold climate they would have been burnt out in a very few days. In the high temperature by which they were surrounded, their reserve stores of fuel were scarcely drawn upon to maintain their body heat, and so remained available for mechanical results. In order to be well and healthy in tropical regions, but a small quantity of food is absolutely necessary. That people should not lose their gustatory tastes in hot climates, and, as a consequence, eat a great deal more rich food than is either necessary or good for them, does not bear on the real question. The ill-health which follows systematic over-indulgence, sufficiently proves the desirability of maintaining a strict moderation in the matter of diet. It is unnecessary and undesirable to furnish to the system in excess the material for combustion. Where there is such indulgence there follow discharges of waste fuel from the liver, and the cooling effects of purgation.

§ 36. For the maintenance of health it is necessary that the temperature of the body be near the normal. It is usually said that the mean normal temperature is 98°·6 Fahr. (37°·5 Centigrade), and the range of normal temperature in the axilla is from 97°·25 Fahr. (36°·25 Centigrade) to 99°·5 Fahr. (37°·50 Centigrade), and that there is a constant oscillation, back and

forward, betwixt the two antagonistic areas of Rosenthal—keeping the heat-production and loss in equilibrium.

The temperature of the healthy human body has been determined by Jürgensen on a larger basis of accurate measurements than before existed. The mean temperature of day and night of a healthy person, as measured in the rectum, is 37°·2 C. If the whole period of 24 hours is divided into two, of which one, commencing at the moment that the bodily temperature reaches its morning minimum, ends with the attainment of the evening maximum, the other corresponding to the interval, it is found that in the diurnal period, viz. between 7 or 8 A.M. and 9 P.M., the mean temperature is 37°·34, while in the nocturnal period, of which the duration is shorter in the proportion 100 to 136, the mean temperature is 36°·94. Jürgensen's researches have led to a most remarkable result, which was entirely unexpected, viz. that the *mean* temperature of the human body is remarkably independent of the conditions which temporarily affect the production of heat, even when their influence is most powerful. Thus, by observations on a vigorous and healthy person who voluntarily submitted to inanition for 63 hours, it was found, not only that the mean temperature of the two days was exactly the same as in ordinary conditions of nutrition, but that the diurnal temperature course was not modified in its character. Again, it was ascertained by the most accurate observations on the same patient, who submitted to a succession of cold baths, each lasting twenty-five minutes, at temperatures varying from 9° to 11° C. (50° F.), that notwithstanding the rapid abstraction of heat, which gave rise to a shivering lasting for several hours, the diminution of bodily temperature which occurred during the bath was followed, after an interval of four or five hours, by an elevation which precisely compensated it, so that if the average was taken of observations extending over a sufficiently long period, the mean was the same as under normal conditions. An exactly similar result was arrived at as regards muscular work, showing that as in the former case the depression, so here the elevation of temperature by active exercise is, in the long run, completely made up for. When it is remembered that all these conditions —inanition, abstraction of heat by the cold bath, and muscular work—are known to produce very considerable effects on the

exchange of material in the body and consequently on the thermogenesis, they afford the strongest possible evidence that increased or diminished temperature has no necessary connection with increased or diminished production of heat.

Speculations have been indulged in as to whether or not there is a "heat-centre" which regulates the heat supply, like the governing balls of an engine; or the steersman of a craft, who by gentle movements of the wheel keeps the vessel's head steady. Its existence cannot yet be regarded as proven. Certainly there are good reasons for holding that there are two sets of nerve fibrils running along the walls of the blood-vessels—at least of the arteries—by which their calibre is maintained. The one, the vaso-motor nerves of the sympathetic, tend to contract the calibre of the vessels; the other, the vaso-inhibitory nerves, derived from the cerebro-spinal system, are antagonistic to the vaso-motor nerves, and produce dilatation.

Between these two sets of nerve fibrils the calibre of the vessels is maintained in constant equilibrium, by perpetual oscillations, however; and similarly the body-heat is kept at a norm by constant back and forward play between the antagonistic heat-producing and heat-losing areas: but here also there is probably some oscillation on each side of the straight line.

By resort to clothes man voluntarily aids in the maintenance of the line of normal temperature. At night, when the surrounding temperature is cooler, he covers himself freely with non-conducting materials, and so retains his heat. This is the more necessary in that the cutaneous vessels are dilated in sleep—to permit of the requisite cerebral anæmia—and so there would be greater heat-loss if not so restrained. When exposed, unprepared, to severe cold it is well known that the man that sleeps—dies. Wakefulness alone can preserve life. In warm climates the clothes are light and of less perfect non-conducting materials, so as to interfere but little with the dispersion of heat. If man is careless about protecting himself warily in the daily changes of temperature, where there are burning noons and chilly nights, disease, the result of temperature-disturbance, will certainly result.

In addition to his clothes man has the aid derived from fire, and the protection from external influences furnished by build-

ings. Further, he can, when exposed to cold, derive much aid from fluids artificially heated. He draws from the fire, by the heated drink, so much warmth, and so saves his own consumption in heat-production. When too much hot drink is indulged in perspiration follows. By reversing this process, and by the inhibition of cold fluids in warm climates, or when surrounded by a heated atmosphere, man cools himself down, or neutralizes the effects of heat accumulated from insufficient heat-loss. The use of iced fluids is greatly on the increase, and the terrors of a chilled draught, when heated, are being dissipated. By such various means, and especially by skilful combination of them, man aids his heat-regulating processes to maintain his temperature at or about the norm.

§ 37. The variations from the normal temperature are of the greatest moment to us. High temperatures, with which we all are so familiar, will engage our attention at considerable length, but, before entering upon that side of the question, we will first examine the subject of low, abnormally low, temperatures. A lowering of temperature may be variously induced; in lesser degrees it is the consequence of exposure, especially without effort (heat-production), or of hæmorrhages, or of free discharges. When more pronounced the fall is called collapse. Slight lowerings of temperature, down to 96° or 95° Fahr., are not in themselves dangerous to life. Further lowering from 95° to 93°·5 Fahr. indicates danger, and needs active measures. The lower the temperature the more active the measures required to maintain life. If the limit 93°·5 is reached the danger is great; and if the temperature falls below 92° there is deep algide collapse, from which the patient rarely, if ever, recovers —except in cases of acute alcohol poisoning, where a temperature of 90° is not incompatible with recovery. Below 92° survival for a brief period is possible, but recovery can scarcely be looked for. Too low a temperature is as incompatible with the continuation of existence as is too high a temperature. States of collapse are more readily induced in children than in adults; in women than in men; in the sick than in the healthy.

Certain injuries of the central nervous system are followed by disturbance of the heat-regulating mechanism. When in a

rabbit a needle is thrust into the median portion of the corpus striatum, there is a rise of rectal temperature amounting to one or two degrees, which may last for several days. This is due to stimulation of portions of the brain in the immediate neighbourhood of the injury. From this experiment and experiments such as these, it is surmised that there are "centres" in the brain which have to do with the regulation of the temperature by controlling the metabolism of tissues. The cutting off of the influence of the heat centres by section of the paths leading from them allows the metabolism of the tissues to run riot and the temperature to increase. The steps by which the conclusion is arrived at are indicated with much force by Stewart in his *Manual of Physiology*, to which the student is referred for details. Burdon-Sanderson has pointed out that a satisfactory explanation of the nature of fever and of its relation to the febrile process is not at present possible, because we are not as yet possessed of the necessary physiological knowledge. There are two theories. One is, that fever originates in disorder of the nervous centres, that by means of the influence of the nervous system on the systemic functions, the liberation of heat at the surface of the body is controlled or restrained, so that "by retention" the temperature rises, and finally that the increased temperature so produced acts on the living substance of the body, so as to disorder its nutrition. The other alternative is, that fever originates in the living tissues, that it is from first to last a disorder of protoplasm, and that all the systemic disturbances are secondary. In both hypotheses it is tacitly assumed that fever is the product of a material fever-producing cause contained in the blood or tissue juice, the morbific action of which on the organism is antecedent to all functional disturbances whatever. At bottom we are all humoralists, and believe in infection. It is not until we have to say where and how the infection acts that questions arise.

The measures to be pursued or adopted for the treatment of low temperatures are various. The first thing to be done is to conserve the body-heat to the utmost, and to economize it by the use of non-conducting materials. In addition to this, external heat can be utilized to lessen the heat-loss, and even to give heat to the body. It is desirable to see that the patient

is surrounded by blankets, or other woollen material; to have bottles of hot water placed around him, taking care not to burn the skin; and further, to furnish to the organism heat artificially, by the administration of hot fluids. These fluids may contain alcohol with advantage; its presence makes them more palatable, while it acts upon the heart, increasing its contractions in frequency and in power. The heat-loss, however, must be obviated, else the alcohol will act mischievously. We shall shortly see that alcohol is a potent means of lowering temperature. As to any medicinal means of increasing heat-production, it is very questionable whether we possess them in practically useful form; and it is more questionable whether we can avail ourselves of them in practice. Such an agent is belladonna, in moderate doses, which notably raises the temperature.

Frequently there occur sudden, passing lowerings of temperature known as "catching cold." The essential starting-point here is the quick abstraction of heat in excess of heat-production. Thus colds are commonly caught by the sudden removal of the body from a persisting high temperature into a cold surrounding medium. The vessels of the skin are dilated and partially paralyzed by the warm surroundings, and when suddenly exposed to the cold environment they, instead of contracting, become still further paralyzed by the cold; and then an immense current of warm blood is brought into contact with the cool air. Great heat-loss follows: but there is not a corresponding sensation of cold, because the current of warm arterial blood prevents the cutaneous nerves from feeling cold, as is illustrated by the hands of the snow-baller, which glow in spite of the contact of the frozen mass. There is, however, much greater heat-loss with these dilated cutaneous vessels than when the vessels are contracted; when the cutaneous nerves are not bathed in a warm current of blood, and so register the sensation of cold. The feeling of cold and the amount of heat-loss are, consequently, often in inverse proportion to each other. Habit endows the system with a certain power of regulating the heat-balance, and of giving off heat when required to meet great heat-loss. This is well illustrated in the case of those much exposed to great variations of

temperature: they become inured to such changes—we say. The system is educated to look after itself, and by habit the vessels of the skin are taught to contract on contact with cold, and so to lessen the amount of blood in the cooling area and to increase the bulk in the internal or heat-producing area. This is the effect of the constant use of the cold bath; viz. to educate the system to develop its heat-regulating actions. When the cutaneous vessels are paralyzed a large mass of blood is in the cooling area, and the heat-loss is great. Further, too, there is a correspondingly small amount of blood in the internal heat-producing area; and the evolution of heat is proportionately small. In the combination of the two we find that loss of temperature known as "catching cold." The secondary fever, often amounting to no more than feverishness, is the consequence of delay in the heat-regulating processes, and an excessive heat-production comes on when too late—too long deferred to be useful. It forms, however, a pyrexia, often calling for our aid to dissipate, or rather to aid in dissipating the excessive heat. The pathology of taking cold is at once simple and highly interesting, while it clearly points out two things. Firstly, how to so conduct matters as to lessen the primitive depression of the body-temperature; for usually the secondary reaction is in direct proportion to this original depression. To avoid cold, then, it is necessary to keep the skin in good tonic action; then it must be borne in mind that if the exposure to cold after being long at a high temperature, as at a ball, for instance, be but brief, the excessive heat merely may be got rid of; but if the exposure be prolonged, then great heat-loss is experienced. The less, too, the system is inured the greater the risk. The second indication furnished is—to get rid of the superfluous heat, occasioned by the delayed heat-production, in other words the pyrexia.

§ 38. An increase in the body-heat forms the condition known as fever. The recognized characteristics of fever, as Burdon-Sanderson has shown, are those which relate either to the disintegration of the living substance of the body or to the increase and diminished constancy of the bodily temperature. But in addition to these attributes which distinguish

the febrile state of the human or animal organism from that of health, it is essential to the correct definition of fever that it should comprehend particulars relating to its origin, progress, and termination. In other words, fever is not merely a state, but also a process. It has its beginning in the entrance into or action on the organism of some affecting or infecting cause. After this event, follows a period which by analogy with certain physiological processes, we are in the habit of calling the period of latency, for it is not until it is passed that the first indications within the affected or infected organism begin to manifest themselves. The state of fever once established, it may vary in its course, in its duration, and in the local inflammations which accompany it, indefinitely; but in all cases it has its onset, accession, and declension, each of which is characterized by more or less distinctive phenomena; the onset by shivering, accompanied with rise of temperature of the internal parts of the body; the augment by continued pyrexia and exhausting disorder of the bodily functions; the decline, epicrisis, or defervescence by the restoration of those processes one by one to their normal conditions and relations. The period of convalescence which follows decline, during which the mischief done is gradually compensated and repaired, and the injured organism is brought back again to its normal condition (so far as this is possible) by new growth of tissue, does not form a part of the febrile process.

A pyretic condition may extend from a mere condition of feverishness, with a temperature of from 99°·5 Fahr. to 101°·5, states often found in children without any sinister meaning whatever; up to a high febrile state of from 107° to 108°·5 Fahr., beyond which existence is possible for only a brief period, and recovery impossible; though there are some isolated cases to the contrary, this statement of Wunderlich is almost universally true. A temperature of 113° Fahr. has been found ere actual death; while a sharp rise of temperature is a common precursor of death in febrile states. In the notorious Scarborough high-temperature case, where the thermometer rose to 122° Fahr., the explanation now largely accepted is, that the thermometer was twirled in a portion of the night-dress; and the friction so produced caused the very high reading.

The different conditions under which pyretic states are found are so numerous, and these pyretic states are so common, that fever, in some form, is one of the most familiar morbid conditions we are called upon to treat. Not only in the ravages of fever known as epidemics, or in its local persistence as an endemic affection, as on the Gold Coast; but in isolated cases, specific fever has for us, as practitioners, a deep interest and a powerful attraction. As typhus it follows overcrowding; as typhoid, or enteric fever, it forms the nemesis of sanitary negligence; as relapsing fever it hangs around periods of famine; while in the form of the exanthemata it is the plague of our youth; as ague it is the scourge of undrained marshes; while as malarial or climatic fever it strews the shores of the Gold Coast, of Guiana, and of the Mexican Gulf with the remains of the natives as well as of the white man. It is commonly found in the form of well-marked specific disease; but it is not essential that it should be connected with anything specific. A prolonged high temperature—no matter how produced—will occasion that state known as "the typhoid condition." We see it produced by hectic in the consumptive; by surgical fever and pyæmia in other cases. Wherever met, it forms a characteristic and a terrible condition; and this consequence of a persistent high temperature is the chief danger of all fevers.

The typhoid condition is announced by the decline of the previous more acute symptoms; by the pulse becoming rapid and soft; the tongue, dry and brown, tremulous, and protruded with difficulty; by the incrustation of the teeth with sordes; by the increasing intellectual disorder, indicated by the constant low muttering delirium, and the greater insensibility and deafness; and by the condition of the muscular system, evinced by muscular tremor and subsultus tendinum, and in some cases by irregularity or intermission of the pulse; by the patient lying sunk on his back, or sliding to the foot of the bed, the muscles being unable to support the body even in the horizontal posture. With this condition all medical men are unfortunately but too familiar. It is a condition which obtains in every well-marked attack of typhus, and is common in severe cases of enteric fever. From its frequent occurrence in specific fever it has acquired

the name of the typhoid condition, and was once supposed to be found solely in specific fever. When this condition showed itself in the course of any other affection, the practitioners of old said, "The disease has turned to typhus;" because they recognized a condition, as they thought, pathognomonic of typhus fever. In this they were distinctly mistaken. It is true that such a state is associated with a sustained high temperature—a condition most commonly supplied by specific fever—but it is not causally associated with the specific fever *per se*, but with the sustained high temperature. They were, then, in error in supposing that the ailment had turned to typhus when they observed a typhoid condition coming on; but, ere the day of the clinical thermometer, the recognition of the association of this state with a persistent high temperature was simply impossible. No blunder is more common than to misconstrue into typhoid fever a typhoid condition of the system.

§ 39. The pathology of the typhoid condition is a matter so important that a section may well be devoted to its special consideration. Such examination of its pathology will both clear up its origin, and point the direction of the therapeutic agents to be employed. To commence with, it is necessary to point out this fact, viz. that at the ordinary temperature of the body the nitrogenized tissues wear away but slowly, and their oxidation is a trivial affair. But as soon as the body-temperature rises, the nitrogenized tissues begin to melt down by oxidation; and there is found a corresponding excess of histolytic products in the blood. The higher the temperature the greater the waste of the nitrogenized tissues, especially the muscles. After a fever, the fat of the body is left comparatively untouched, but the muscles are shrunken and wasted. A microscopic examination of the muscles after death from fever demonstrates that they are the subjects of extensive structural changes. Zenker has pointed out these changes, and his observations have been corroborated by others. The changes are not so marked where death has taken place in the earlier stages of the pyrexia, but if it has been delayed till the later period, they are very distinct. There are two forms of degeneration, the granular and the waxy. The granular form consists in the deposition of

minute, highly-refracting granules in the contractile tissue, giving to the fibres a dark appearance by transmitted light, and obscuring the striæ. This muscular deposit is not wholly composed of fat. The degenerated fibres are very friable. The waxy form consists in the transformation of the sarcous tissue into a homogeneous, colourless mass, glittering like wax, and causing a complete obliteration of the striæ and nuclei of the fibres, the sarcolemma remaining intact. The waxy cylinders thus formed crack up into numerous fragments, which crumble down into a finely granular detritus, and this is gradually absorbed. Rindfleisch gives a plate of these changes in the muscular structure of the heart after relapsing fever. Such changes are not only found in the dead, but, by a process known as "harpooning the muscles," identical changes have been found in fever patients alive, and who have ultimately recovered. They are not, then, *post-mortem* changes; they are the changes wrought in the muscle by a sustained high temperature. They are not confined to febrile conditions of a specific nature; they are found also in the hearts of women who have died from puerperal septicæmia.

Such being the actual condition of the muscular structures of the body, we can feel no surprise at the sense of prostration which is so marked in the typhoid condition. Muscular weariness is an initial symptom of fever; muscular prostration marks its height. If you could place your fever-patient at the bottom of a mine twice the depth of the deepest mine in Cornwall, and compel the wretched sufferer to climb its ladders into open day, you would subject him to less torture from muscular exertion than that which he undergoes at the hand of nature as he lies before you, helpless, tossing, and delirious, on his fever couch. There is a direct relation between the temperature and the amount of urea. And there is a close correspondence between the amount of urea and the temperature: the greater the amount of urea, the greater the temperature. The normal excretion of urea *per diem* is about 400 grains, but as far as 1,065, and even 1,235 grains have been excreted in one day in pyrexia. Some of this might be due to the albuminoid matters given to the patient as food, or there may have been imperfect action of the kidneys for some time before; still, admitting all this, there is a

large quantity of urea remaining, which is, in all probability, the result of tissue-waste.

In the early stage of fever a patient excretes about three times as much urea as he would do on the same diet if he were in health, the difference between the fevered and the healthy body, consisting chiefly in this, that whereas the former discharges a quantity of nitrogen equal to that taken in, the latter wastes the store of nitrogen contained in its own juices. That this disorder of nutrition is an essential constituent of the febrile process is indicated by the fact that it not only accompanies the other phenomena of fever during their whole course, but precedes the earliest symptoms and follows the latest. That it anticipates the beginning of fever was demonstrated by Sidney Ringer, who made the important discovery that in ague the augmentation of the urinary discharge of nitrogen not only begins some time before the accession of the cold stage, but even precedes the rise of temperature. That the same condition continues after the crisis has past, *i. e.* the temperature has begun to sink, has been shown by Squarey from his investigation of eighteen cases of typhus, in all of which the daily excretion of urea was measured, and the variations of temperature were observed during the whole course of the disease, and the observations were continued until convalescence was completely established. In these cases it was found that, whereas the bodily temperature which in this disease rises rapidly at the beginning, and keeps up without sensible abatement during a period which often extends to the middle of the second week, usually begins to fall after the tenth day, the daily rate of discharge of urea, although above the normal during the first week, did not attain its maximum until the temperature had been falling for some days.

In cases of pre-existing kidney disease, the elimination of urea in fever is impeded, and consequently the waste products of histolysis accumulate. The gouty diathesis, from its being so often associated with disease of the kidneys, is a very serious complication. Urea not being found in excess in the urine may, then, point to a still more perilous condition than its presence in excess would indicate. These are important points to be considered; not only in the estimation of the patient's

danger in a typhoid state, but they also bear directly on the remedial measures to be employed.

A still more important matter to recognize is this:—The excessive waste of the nitrogenized tissues in febrile states, proportioned, we have been told, to the rise of temperature, is not solely connected with specific fever Thus Unruh found an excess of nitrogen in the urine in twenty-eight cases of febrile temperatures, of which sixteen only were specific fevers. In all of them, however, the amount of nitrogen was high, amounting to half as much again as is the average in health; while in some cases it was twice as much. Naunyn found, by experiment, that an increased body-temperature was produced by the simplest of all methods of raising it, viz. by confinement in a heated atmosphere saturated with moisture; and along with this rise there was found an increase in the amount of urea. These experiments corroborate the views of Traube, Vogel, and others, that the excess of urea is the measure of high temperature, *pur et simple*, without relation to its cause. The association of the excess of waste products with the typhoid condition, where, we have seen, the muscles undergo degeneration in life, and their production, in undue quantities, in the simplest forms of high temperature, close the circuit in this direction; and point to the conclusion that these changes in the muscular structures, accompanied by the formation of urea in excess, are the consequences of a sustained high temperature without reference to its causation.

It is a matter then of the greatest practical importance that we should clearly recognize these facts, as to the manner of the production of the typhoid condition—which is essentially the same in specific and non-specific pyrexia. Its treatment—speaking broadly—is the same, whatever the form of disease with which it is causally associated, or co-existent. Its oncome is of deep import, and indicates a condition of peril whenever and wherever met. Everywhere and ever, a typhoid condition is a condition of grave seriousness.

§ 40. We have seen that the typhoid condition is associated with a high temperature, no matter how produced. We will now see how far this pathological review will explain the condition of the patient, and the peculiar symptoms of this state. It is prob-

able that the temperature of the blood going to the brain has somewhat to do with the production of that abnormal condition —the delirium. There is much evidence tending to show this: viz. its association with high temperatures, and its removal by lowering the temperature by means of the application of cold. With the fall in the temperature the reason returns and resumes its wonted sway. This, too, is quite irrespective of ultimate recovery or death. Delirium is extremely common in children during febrile attacks, and sharp high temperatures are common also: the two commonly go together. An excitable brain is much more easily thrown off its equilibrium than is a less mobile one. The functional disturbances of the nervous system are—nevertheless and admitting all this—in the typhoid condition, chiefly produced by the waste products in excess in the blood. Observations which have been made in relapsing and pythogenic fevers support the opinion that the head symptoms of typhus are due, not to inflammation, as was once believed, nor to the presence of the original fever-poison in the blood, but to the circulation through the brain of urea, carbonate of ammonium, or other products of disintegrated tissue. As in other febrile conditions, the increased formation of urea, notwithstanding the diminished supply of food, is evidently the result of an exaggerated disintegration of the muscular and other nitrogenized tissues. As long as the urea continues to be eliminated by the kidneys its effects are comparatively trifling; but if the quantity be excessive, and, still more, if from any morbid condition of the kidneys, either antecedent to or resulting from the febrile attack, its elimination be interfered with, it accumulates in the blood and gives rise to uræmic symptoms. When the urine is completely suppressed, as sometimes happens, death speedily ensues, with symptoms of coma, and sometimes uræmic convulsions; but if the suppression be less complete, it may still give rise to delirium, stupor, and coma. The brain is poisoned by the waste products in excess in the blood, there being direct evidence to show that the blood does contain urea, in this condition; and the congeries of symptoms, so produced, is perfectly characteristic, especially when read in connection with the peculiar muscular symptoms. The oncome of the symptoms of the typhoid condition ever indicates the presence of the products of histolysis in the

blood in excess; the lighting up of the intelligence marks the cleansing of the blood, and an improvement in the condition of the patient generally. Under certain circumstances this grave typhoid condition is comparatively free from danger, as in the course of specific fevers in the young; but when found in the elderly, and associated with chronic renal disease, it is ever fraught with peril, and is commonly fatal.

As the direct consequence of a sustained high temperature, the typhoid condition indicates what measures should be employed for the arrest of its oncome, viz. means calculated to keep down the temperature; it shows the dangers which accompany a sustained high temperature, and the importance of apyretic measures. At the same time its own production, or genesis, is very instructive in pointing out to us what measures we should adopt in the treatment of the condition itself.

By careful and repeated examination of the urine, along with similar temperature observations, and a general summing up of the various symptoms, it is possible to calculate fairly well what the exact position of the patient is; and whether the kidneys are equal to their work or not. As the condition progresses—as if unrelieved it certainly will—the general indications show that the system is becoming more and more poisoned by the products of histolysis. There is the persistence of the posture in bed, viz. on the back, with the tendency to slip to the foot of the bed, indicating the muscular prostration; there is the starting of the tendons, due to the clonic spasms of the muscles in connection with them, which differ but in degree from general convulsions; there is inertness of the sphincters; there are also disturbances of vision, indicated by the picking of the bedclothes, and the graver indications, disturbances of hearing, as imaginary ringing of bells, &c., showing how deeply the nervous system is affected; there is also a brown, chapped tongue, well retracted, the brown fur consisting of an accumulation of dead epithelial scales—significant of the condition of the whole intestinal canal; with brown sordes on the teeth of similar origin, accompanied by the formation of crusts upon the lips; there is the hissing respiration, so characteristic of this condition, and contrasting with the stertorous breathing of

apoplexy; and very often an urinous odour of the breath, due to ammoniacal matters, which form crystals of muriate of ammonium when a glass slide moistened with hydrochloric acid is held under the nostrils. Everything goes to show how deeply the system is under the influence of products formed from disintegrating tissue, by the effect of a sustained high temperature. There is much to demonstrate the importance of preventing a high temperature being reached; or if that be impossible, or we do not see the case till a high temperature is already inaugurated, of lowering it as speedily and effectually as may be.

§ 41. *Antipyretics.*—For the purpose of lowering the body-temperature various means have been resorted to from time to time, according to the state of our knowledge, the fashion of the day, and the progress of physiology; consequently we have had bleeding, diaphoretics, depressants, various applications of cold, and a strictly scientific use of agents acting upon the circulation, and through it affecting the temperature. The manner of action of each is widely different; the end reached in each case the same.

An increase of temperature must depend upon one of two things: (1) an increase in heat-production, and (2) an imperfect heat-loss; in some cases the two are combined. Some remedies act upon the heat-production, and lessen it; others act so as to increase the bulk of blood in the heat-losing area, and to set up perspiration with its cooling effects. Bleeding belongs to the first of these. Bleeding, or venesection, is now almost obsolete as a general practice, chiefly in consequence of its abuse. It is an effective measure for the lowering of temperature, and may still be resorted to beneficially in rural practice, when it is desirable to produce an impression, quickly and decidedly, upon a rising temperature. Marshall Hall found bleeding to lower the temperature, but it rises again; and bleeding should be confined to making an initial impression, and its effects should be followed up by the administration of depressants. Bouchut has recently advocated the practice of bleeding, and has found that a fall of two or three degrees Fahrenheit is quickly produced by venesection. The error of bleeding was the excessive abstraction of blood at one time, or the repeating it to meet the after-rise of temperature, instead of resorting to antipyretic

remedies. Where its use was followed by the administration of salines, or the old "fever mixtures," the effects of venesection were far from undesirable.

Another method much in vogue at one time, was the use of mineral acids to check high temperatures. As to their practical efficiency there exists no manner of doubt. As to their mode of action we, as yet, know nothing. Acids are nevertheless excellent febrifuges, and in the tropics, and sub-tropical climates, acids and sub-acid fruits are largely used for their heat-lowering properties. The acid treatment of fevers is very extensively practised, and in the war of 1870-71, the recoveries under the plan of fresh air and sour wines were very numerous and satisfactory.

Acid. Hydrochlor. Dil. ℥xv.
Syr. Aurantii, ℥i.
Aquæ, ℥ij.

every three or four hours, is a pleasant and grateful mixture to administer to a fever-stricken patient; and it may be continued through the whole course of an ordinary uncomplicated typhoid fever case into the convalescence, when it may be exchanged for a tonic. The aromatic sulphuric acid may be substituted for the hydrochloric, if an astringent is indicated. With some the dilute phosphoric acid is the favourite agent.

Salines of various kinds have been much used for the treatment of febrile conditions. Salines, however, have been resorted to rather in febrile conditions associated with local inflammatory changes, and in the exanthemata, than in simple continued fevers. Irrespective of any action they may have upon the blood, they usually act upon the different excretory organs, as the skin, bowels, and kidneys. The Liquor Ammoniæ Acetatis is a famous remedy in the pyrexia of children, and of sub-febrile conditions in adults. It is a capital agent for the dispersion of accumulated heat, dilating the cutaneous vessels, and increasing the action of the sudoriparous glands, and so encouraging heat-loss. It should be given in half-ounce doses every four hours with spirit of chloroform and compound spirit of ether.

An old formula, once in most extensive use, was something of this sort :—

Vin. Ant. Tart. ℥xx.
Tinct. Hyoscyami, ℥xxv.
Liq. Amm. Acet. ℥i.

every four or six hours. Probably this is a standard fever mixture with hundreds of practitioners at this day. It is fairly effective.

Citrate of potassium, the nitrate and acetate of potassium (not pleasant forms), the bitartrate of potassium, sulphate of sodium or magnesium, have all been used in the treatment of pyretic affections. All forms of potash act upon the skin as well as the kidneys; and the effervescing citrate of potassium acts powerfully as a diaphoretic upon some persons in summer. A sharp action on the bowels also lowers the temperature, at least for a time, and so purgation may be indicated; and in combination with either of the formulæ just given, a seidlitz powder, or a draught of laxative water, may often be exhibited with advantage. Wunderlich states that vomiting depresses the temperature more effectually than purging, the reaction being the same in each case. The nausea produced by antimonial and ipecacuanha wines has probably much to do with their efficacy as febrifuges; but of that anon.

In ordinary colds, with a dry burning skin, it is often necessary to give nauseants in full doses to produce a sufficient impression upon the skin; and such doses disorder the stomach much, and not rarely interfere with the administration of other remedies. In order to avoid this resort to nauseant diaphoretics, the idea of acting upon the skin directly by warm baths, and so exciting it to renewed action, has obtained extensively. The ordinary warm bath, especially for children and infants, who can be readily put into a bath, or even a bowl of warm water, is very convenient; but such baths for adults are unattainable in the homes of the poor. For their needs the late Sir James Simpson devised a most capital bath. It consists of the simple apparatus of six or eight soda-water bottles, as many woollen stockings, and some hot water and corks. Each bottle is filled with hot water, and tightly corked. Then a stocking is wrung

out of hot water, so as to be moist, but not dripping, and drawn over the bottle (as it is over the foot when put on); each bottle, so encased in the moist stocking, is put into bed, and the whole are placed around the feverish patient. So packed round the sides and between the legs, &c., each bottle steams away, the moisture of the stocking making the air damp. In from twenty to thirty minutes a thoroughly free perspiration is in full swing; and thirty-five minutes are usually enough for one bath—at least with most persons. If the patient is then wrapped in a blanket and covered up for thirty or forty minutes more, the diaphoresis is kept up; and then the patient may be unwrapped and left in bed, with his skin moist and bedewed with perspiration. If the bed is improperly wet the patient may be removed into another bed, which has been previously thoroughly well aired and warmed. If only one bed is available, the patient must be enclosed, along with his bottles, in a large blanket, which can be removed, leaving him in bed after the bath is over. Combined with iodide of potassium and acetate of ammonium, this bath forms a capital treatment for the first stage of a simple pyrexia: it is at once efficient and safe.

The best of all diaphoretics is pilocarpine, one of the active principles of jaborandi. From a quarter to half a grain administered to a patient in bed either hypodermically or by mouth will produce profuse sweating and salivation almost instantly. There is not the slightest fear of the action going too far, for the very smallest quantity of atropine, say one-hundredth of a grain, will antagonize the drug almost in a moment, and prevent the further development of the symptoms. The drug most closely allied in physiological action to pilocarpine is muscarine, the active principle of poisonous mushrooms, but this is rarely used in medicine.

§ 42. Ere proceeding further with the action of antipyretic or febrifuge remedies, it may be as well to glance again at the causation of pyrexia, in so far as it gives us indications for treatment. A rise of temperature is generally associated with a lowering of blood pressure, a dilatation of the peripheral arterioles, and a rapid action of the heart. The consequence of this rise is that there is a free flow of blood through the capillaries, and an increased number of respirations per minute,

with possibly some action upon the tissues themselves, about which we can only as yet speculate; all of which combined bring about an increase of oxidation, and keep up the high body-temperature. In addition to this, Cullen held there was spasm of the arterioles of the skin, and so lessened heat-loss. Leyden thinks there is not diminished heat-loss, but that the heat-loss is not sufficient to meet the increased heat-production; and so the body-heat accumulates, causing a rise of temperature. It is obvious, then, that our remedial measures must take the direction of attempting to restore the lost balance between heat-production and heat-loss. We have just seen that increased action of the skin exercises a most distinct effect upon heat-loss. Consequently agents termed diaphoretics have been rationally, and logically, resorted to in the treatment of pyrexia. Experience, however, has taught, what our scientific knowledge now explains, that the diaphoretics to be selected for the purpose of lowering the temperature are those exercising a depressant action; that is, they not only act upon the cutaneous vessels, but they at the same time depress the circulation. They are the nauseant or depressant diaphoretics, of which antimony and ipecacuanha are the best known instances. These agents not only dilate the cutaneous vessels, and act upon the sudoriparous glands; but they also depress the action of the heart, and so retard the circulation, and with it lessen the chemical interchanges.

Rasori, in 1800, introduced the plan of treating fevers and inflammations by full doses of tartar-emetic. The plan was very successful, but was much abused; and has now for some years been out of general favour. Nevertheless it was an efficient plan, especially in small and oft-repeated doses, so as to produce a steady effect, instead of the oscillations of distinct depression and after-rise, which follow any one decided blow by a large dose, or a repetition of powerful blows at long intervals. Hufeland regarded bleeding with tartar-emetic and opium as the basis of all therapeutics. This plan of Rasori led to another step in the same direction by Fleming of Birmingham, who in 1844 struck the key-note of a new and most successful treatment. Observing the objectionable effects of antimony in large doses upon the system, and the gastro-intestinal disturbance

so produced, he investigated and brought forward the action of aconite as a febrifuge. Aconite had been investigated to some extent by Störck in 1763; but it was left to Fleming to establish its position. He found that it lowered the pulse both in force and rapidity—that the pulse was lowered sometimes thirty or forty beats per minute. At the same time the action upon the skin was to bedew it with moisture. In practice he often combined aconite with bleeding, and found the aconite most beneficial in maintaining the action of venesection and preventing the reaction or after-rise of temperature. Ringer says:—"Aconite is to be most esteemed for its power, little less than marvellous, of controlling inflammation and subduing the accompanying fever. It will sometimes at once cut short an inflammation. It will not remove the products of inflammation, but, by controlling the inflammation, it prevents their formation, so saving the tissues from further injury. When given in the earliest stages of the commoner and milder pyrexiæ, the skin—dry, hot, and burning—becomes in a few hours comfortably moist; and in a little time longer is bathed in a profuse perspiration, often to such an extent that drops of sweat run down the face and chest. With the sweating comes speedy relief from many of the distressing sensations, as restlessness, chilliness, heat and dryness of the skin, aching pains and stiffness; and at the same time the quickness of the pulse becomes much reduced in frequency, and in a period varying from twenty-four to forty-eight hours both pulse and temperature reach their normal state." He adds:—"The method of employing the drug has much to do with its efficacy. It should be given, as already stated, at the beginning of the disease; the medicine should never be delayed; every hour is of importance. Half a drop or a drop of the tincture, in a teaspoonful of water, should be given every ten minutes or quarter of an hour for two hours, and afterwards hourly; and if there be much prostration, with a feeble and weak pulse, a still smaller dose."

Veratrum viride is a remedy in much repute in the United States. Veratrum does not seem to have much action upon the skin, but its action upon the circulation is energetic. When true sthenic arterial excitement is to be combated in

any disease, except it be gastritis, veratrum viride may be employed as a prompt, thoroughly efficient, and at the same time very safe remedy—very safe, since it is almost incapable of producing death in the robust adult, unless used with great recklessness, and in repeated doses. In administering veratrum viride it should always be borne in mind that it will do no good in acute disease unless given in increasing doses until its physiological action is manifested. In almost all cases vomiting is to be avoided as far as possible. To do this, small quantities of the drug should be given at short intervals, and corresponding doses of laudanum (five to ten drops) should be exhibited fifteen minutes after each dose of the veratrum viride. An hour is generally the best interval between the doses. The addition of the opium will serve several good ends, especially in its action upon the nervous system, and in its effects upon the skin.

A word upon the use of opium in the treatment of high temperatures may not be out of place. Given alone in pyrexia, the action of opium is unsatisfactory. As we have seen in an earlier section of this chapter, high temperatures seem to excite the brain, and the first effects of opium would add to the existing excitement. The combination of opium with antimony, a direct depressant, has been found desirable and efficacious. The less the pyrexia, the less the antimony; the greater the vascular excitement, the greater the dose of antimony, was the rule. Each drug appears to assist the action of the other; and the relative doses must be determined by the circumstances of the case. In furious delirium the tartar-emetic must be given in full, and the opium in small quantities; while if wakefulness is the chief symptom, the delirium being not very boisterous, the dose of antimony must be reduced and the opium increased. This rule for the combination of opium and antimony, here given, shows consummate skill in the prescriber—skill, however, which all ought to aim at, even if it be given but to a few to attain it. Opium and antimony may often be given with advantage together at bed-time, as a grain of opium with five grains of pulv. antimonialis, along with the fever mixtures given above. When the fever is very sthenic, something like the following may be given:—

Vin. Antim. ℥xx.
Tinct. Opii, ℥xv.
Liq. Amm. Acet. ad ℥i.

every four or six hours. It will be found an effective mixture in sthenic pyrexia. Or opium may be given alone in pill, or with a few grains of Plummer's pill, or as Dover's powder.

Amongst the more modern remedies for the reduction of temperature may be mentioned the synthetical compound known as antipyrin, phenazone, or analgesine. Its use as an antipyretic is however on the wane, and it is now commonly employed for the relief of pain. It is not a very safe drug, and it should be administered with considerable caution. "After small doses you may get epigastric pain, nausea and vomiting, followed by weakness of the pulse, hurried respiration and cyanosis. In some cases you have persistent sneezing with lachrymation and flow of mucus from the nose. After larger doses headache, vertigo, yawning and drowsiness, loss of memory, confusion of ideas and deafness are not uncommon. In several cases prompt collapse has followed the administration of large doses of the drug. Even small doses may induce itching of the inner side of the thighs followed by a crop of urticaria, which gradually extends over the abdomen" (Murrell, *What to do in Cases of Poisoning*).

Antifebrin or acetanilide is perhaps safer, but its employment in even moderate doses is sometimes followed by cyanosis, prepitation, diplopia, and other disagreeable symptoms.

Quinine in large doses is undoubtedly a valuable antipyretic. It is especially indicated in the pyrexia associated with malaria. "The best plan is to give the first ten-grain dose about the end of the sweating stage, and to give the last ten-grain dose just before the next fit is due. It is not a matter of much importance in what form the quinine is given; some people take it as a powder, others like it in pills, whilst others again dissolve the dose in a small quantity of sherry. If it is not retained by the stomach, it had better be mixed with four ounces of beef-tea or gruel and injected into the rectum. Hypodermic injections of quinine are not very satisfactory, but a grain of the hydrobromate may be dissolved in six minims of water, of which the

dose is from three to six minims" (Murrell, *Pharmacology and Therapeutics*).

In addition to the remedies given above there are other measures which are useful in pyrexia for dissipating heat: one of the most effective is alcohol. It has been found that alcohol acts very powerfully upon the cutaneous vessels, dilating them, and so increasing the bulk of blood in the external cooling area of Rosenthal. Whatever other points there may be in the action of alcohol leading to the lowering of the temperature, there is unanimity about this. Schmiedeberg holds that alcohol interferes with oxidation, and in this way also lowers the temperature. Binz says that if the heart is excited by alcohol while the vessels of the skin are dilated a large mass of blood must be driven through the cooling area. The effects of alcohol in predisposing those under its influence to die of cold in low temperatures are well known. Thus in cold days men under the influence of excessive doses of alcohol often become benumbed, and have to be put into warm beds, and have heat artificially administered, in order to restore them. The plan of taking alcohol on going out into the cold is a most mistaken one. It may produce a sensation of warmth by dilating the vessels of the skin, and so bathing the cutaneous nerves in a current of warm blood; but in doing so it increases the heat-loss. In warm weather a dose of alcohol, with many people, at once produces a flow of perspiration; but this action upon the skin may lead to serious depression of the temperature in cold climates. As a means of dispersing accumulated heat alcohol is often very serviceable.

§ 43. Such are the measures to be resorted to in pyrexia associated with heat-accumulation, from defective heat-loss. When pyretic conditions are found with a dry burning skin, and arrest of the action of the sudoriparous glands, the restoration of the function of these glands and the relaxation of the cutaneous vessels are the ends to be aimed at. Leyden has found that in increasing fever there is no evaporation of water to be demonstrated under an impenetrable covering; while in defervescence there is always a well-marked perspiration and exhalation of water. The effects of water exhalation and the change of form from water to vapour, with its cooling effects

upon the body-temperature, are too much mere physical facts to permit of any doubtfulness about their action. With pyrexia under such circumstances, the agents to be employed are the depressants just given; there is defective heat-loss, and this must first be increased.

When, however, there is pyrexia with a moist perspirable skin other measures are indicated. Here there is no defect in heat-loss, and, as the skin is already moist, it is well to resort to antipyretic agents, which appear to strike directly at heat-production. Such agents we possess in quinine and digitalis. The antipyretic action of these agents has been chiefly worked out by German observers. Wunderlich found that quinine in pretty large doses, as from twenty to thirty grains, divided into three doses, given within a few hours of each other, had a decided effect in lowering the temperature in typhoid fever. In some cases a fall of several degrees was observed; in one the fall was from 105°·8 Fahr. to 97°·25. Liebermeister has found, from a large number of observations, that quinine distinctly lowers the temperature in typhoid fever. It is not in typhoid fever only that quinine exercises this antipyretic effect, for Kerner and Jürgensen found that quinine arrested the rise of temperature which ordinarily follows exercise. As to how quinine exercises this action, is not quite clear. It has been held by some, as Ackermann for instance, that quinine, like digitalis, raises the blood-pressure, and so limits tissue-changes; but other observers deny that quinine does raise the blood-pressure. It is surmised that quinine exercises its antipyretic action by virtue of some effect upon the nervous system; but this is not yet demonstrated. The elaborate labour of Binz leads to the supposition that the antipyretic action of quinine lies to some extent in its checking the ozonizing power of the blood. Whatever the explanation, there is no doubt that quinine exercises a powerful action upon heat-production in pyretic conditions.

Digitalis has also been used for its antipyretic action. Wunderlich found digitalis to distinctly affect the temperature in the latter stages of typhoid fever. The fall lasts about twenty-four hours, and is then followed by a rise, which never, however, attains the original height. Other observers have noted the

antipyretic action of digitalis. Bernheim found digitalis always to produce lowering of temperature in typhoid fever; either complete defervescence or remission; that the pulse and temperature fell together, but not always in a parallel manner; and that the delirium often ceases with the decrease of heat, and the respiration is calmer.

In fever there is partial vaso-motor paralysis, with dilated arterioles, a low blood-pressure, and increased tissue-change, in and around the dilated terminal vessels. Digitalis contracts these vessels, raising the blood-pressure. Ackermann states that as the blood-pressure rises, the temperature falls; and that as the blood-pressure falls the temperature rises; that there is, in fact, an antagonism betwixt the temperature and the blood-pressure. There is no doubt a good deal of truth in this, and such is probably the explanation of the antipyretic action of digitalis.

Digitalis and quinine may be profitably combined in the treatment of pyretic conditions where the skin is moist. They may be prescribed with mineral acids in the following form:—

Quininæ Sulphat. gr. v.
Tinct. Digital. ℥xv.
Ac. Phosph. Dil. ℥xv.
Aquæ, ℥i.

every four or six hours. In a case of *post-partum* pyrexia, with a temperature of 105° Fahr., and a skin bedewed with perspiration, this combination brought the temperature down to 101° in twenty-four hours; and that too whilst the case steadily proceeded to a fatal issue in a few days. This shows that the fall was not due to any general improvement, but directly to the antipyretic action of the remedies. The value of this plan of treating pyrexia is shown by the following case. A lady, five weeks after confinement, became feverish and ill. When seen she had had a temperature of 103° for six days. She was then flat on her back, delirious, with sordes on her teeth and lips, while her tongue was covered with a thick brown fur. Her urine was laden with albumin. The typhoid condition was well marked, while the skin was moist. The above mixture was prescribed. In forty-eight hours the temperature had fallen

to the normal, and the urine was free from albumin. She made a steady recovery.

This treatment of pyrexia by digitalis, although constantly advocated by German observers, is not free from danger, and should be certainly resorted to with the utmost caution. The successful cases are reported, but one hears little or nothing about the patients who fall back dead when taking large doses of the drug.

When the typhoid condition is established, depressant antipyretics are distinctly contra-indicated; and the measures just described should be adopted. The last formula might be used, and with it alcohol might be freely administered, together with milk and other nutrient fluids. But it must be admitted that when the typhoid condition is pronounced, the chief hope lies in the capacities of the organism, and it becomes largely a question of stamina. The more need then to avert its oncome, if possible.

From what has just been said, it is perfectly obvious that in taking the temperature the medical man must do something more than merely note the rise of the register. In addition to the mere body-heat, there are the equally important matters of the condition of the skin, and the amount of perspiration, telling of the amount of heat-loss going on, to be observed. While taking note of the actual temperature, it is necessary to apply the trained intelligence, and to have a clear comprehension of the how and why of the febrile state, as to the relative amounts of increased heat-production or diminished heat-loss, and to calculate exactly the factors of the febrile state and to select the remedial measures accordingly.

§ 44. The application of cold in the treatment of febrile conditions dates back beyond the days of Hippocrates, and seems to have taken its origin in man's instinctive acts long ere the era of written letters. The use of cold in the treatment of disease may be traced to the very earliest historical periods and in the records or usages of every people. Savage and civilized nations have employed it, and it has been equally the instrument of physicians and the resource of quacks. Sydenham was the first of modern physicians to treat fevers systematically by cool surroundings, cold water, and fresh air. After him

Cullen advocated the treatment of pyrexia, and the dispersion of accumulated heat, by the external application of cold in the form of baths. It has been left, however, for Liebermeister, of Basle, to introduce the use of external cold in the treatment of pyrexia on a well-established basis. It is a rational and sensible plan of getting rid of superfluous heat; and though there are some popular prejudices to be overcome, this plan of treating hyperpyrexia will obtain more and more. The feeling of comfort, the loss of muscular weariness, the diminished thirst and restored consciousness given by a cold bath, all testify to the relief afforded by the reduction of the temperature. The loss of body-heat so brought about, relieves the patient from the direct consequences of a high temperature enumerated above.

Cold sponging with vinegar and water has long been a recognized method of relieving the burning heat which obtains during the coming out of the eruption in the exanthemata. More efficient measures are now adopted. The cold wet compress; frequent washings with cold water; an ordinary bath gradually cooled; and the cold wet sheet, are the chief forms. The packing in a cold wet sheet has found many supporters. It forms an effective measure, readily applied in the humblest houses. The patient can be wrapped in the wet sheet, and when swathed in a blanket be put into bed: and this could be repeated at intervals, four or six times a day, as long as the temperature keeps rising. All would depend upon the progress of the case: and it is very desirable for the interests of this method that every medical man, commencing this line of treatment, should first put it into practice in his immediate neighbourhood, so that he can keep the patient under his own eye.

The method of putting the patient into a warm bath and then gradually cooling it down with cold water is excellent. Ziemssen and Immermann immerse their patients in a bath at 95° Fahr., and in the course of twenty or thirty minutes gradually cool it to 60° Fahr. This bath is agreeable to fever patients. Such external application of cold ought to be generally adopted, and in most cases will be found practicable in some form. The feelings of the patient will usually secure

the continuance of the treatment, even if the friends are somewhat timid, and unnecessarily afraid of potential evil consequences. As to the treatment of high temperatures by iced fluids internally, or pieces of ice to suck, it is to be hoped that no one would be at once so ignorant and so cruel as to withhold them. They will usually relieve the sensation of thirst, and do not create nausea.

The cold thus taken into the body destroys or neutralizes so much heat, and in doing so aids to reduce the body temperature. In our treatment of pyretic conditions we should aim at keeping down the temperature on the one hand, and dissipating the superfluous heat on the other, by every means in our power. Consequently in addition to the measures above mentioned it is desirable to place the patient in a cool well-ventilated bedroom, in which a current of air can be maintained without exposing the patient to a draught. Unless there are lung complications the air may be allowed to play above and around the patient, especially while the temperature is rising. By such means several ends are served. The cool air respired destroys so much heat, while the cooler temperature around the body increases heat-loss from the general surface. In order to secure this latter the bedclothes must not be too thick; a sheet or light blanket is often sufficient for the day, especially in warm weather; but in cold weather, and at nights, a second blanket may be desirable. It is easy if any chill be experienced to give some warm fluid or to put on some more "cover"; but, as a matter of fact, in a rising temperature with a dry burning skin chills are not readily produced. There is not here the same risk of carrying the cooling process too far that exists when the body is heated and perspiring freely; then the cooling is easily carried too far, and a serious chill is often the result of careless or prolonged exposure to cooling agencies. But there is all the difference possible between such dispersion of accumulated heat in a healthy organism, with a glowing and perspiring skin, as is safe; and the exposure to cooling influences which may be not only undergone with safety, but even with actual benefit, when there is excessive heat-production and a dry burning skin; as is the case in the pyretic rise of a severe attack of fever. In the latter case the increased heat-

production soon meets and neutralizes any chill; in the former excessive heat-loss is followed by a subsequent rise of the temperature, and may easily be induced unless good care be exercised.

The whole subject of body-heat, its production, its dispersion and their disturbances, call for more general attention than they have yet succeeded in attracting. The use of the clinical thermometer as a diagnostic aid is now very general, but a like interest in the *rationale* of hyperpyretic temperatures is far from being equally general. Men will use a thermometer assiduously who cannot, however, be induced to give much thought to the how, the why, and the wherefore of the pyrexia, and consequently of the best means of reducing it. And yet this is what the clinical thermometer, properly and intelligently used, ought to be the means of attaining. It should not only register the actual temperature, but it should furnish information as to the amount of heat-dispersion, and so yield indications for the selection of the antipyretic measures best adapted to the exigencies of each case.

CHAPTER V

INFLAMMATION: ITS VARIETIES

§ 45. The morbid process denominated inflammation is a curious and often complex affair. Whether it be always a disease, or always a reparative process is a question which can be more easily raised than settled. Without it the injuries inflicted by accident, or deliberately by the surgeon, would remain unrepaired. By its means a fractured bone is united, and at the same time the fractured ends are maintained in their place by an inflammatory cell-formation around them, which consolidates the surrounding tissues and keeps the parts at rest. The less perfect the appliances of man, the greater the efforts of Nature to procure quietude. Every reader of Hilton's *Rest and Pain*—a work responsible for a large proportion of the stiff joints and atrophied muscles met with in our daily practice—will remember the case of the washerwoman with the broken collar-bone. She persisted in working, unconscious of the fracture; and the movements of the arms, necessitated by her occupation, disturbed the fractured ends, and Nature threw out such a mass of callus that it was mistaken for a bony tumour. Ultimately, having achieved the desired end, this natural splint gradually disappeared; leaving an instructive lesson behind it. The bands of plastic lymph which form in enteritis are the consequences of the movements of the intestines which they tend to arrest. Their continuance, however, forms a source of the greatest danger to the life of the individual in whose abdomen such plastic bands lie hidden. If it were not for an inflammatory process which forms a defensive wall, how commonly would gastric ulcer lead to perforation of the stomach.

By its means abscesses find their way safely from the interior of the body to the external surface, and so the organism is preserved.

Inflammation is the reaction of a living tissue against an injury. As Burdon-Sanderson has pointed out, when a living tissue is injured mechanically or chemically without being destroyed, it becomes the seat of a succession of changes which are the products of the disorder of the vital functions of the injured parts. These changes collectively receive the name Inflammation. The term comprehends, therefore, an assemblage of phenomena, held in relation with each other by the circumstance that they are all effects of the same injurious agency, and that they all form parts of one process, of which the various stages follow each other in more or less orderly succession.

The first local effect which an injury produces in a living part is vascular; it manifests itself as above indicated in two directions simultaneously. On the one hand, the state of contraction (or tonus) of the smallest arteries is altered or modified within and around the seat of injury in such a way as to determine increased supply of blood to the injured part; on the other, the walls of the capillaries undergo imperfectly understood changes, by virtue of which the liquor sanguinis (plasma) and corpuscles sweat or squeeze out into the lymphatic spaces in which the elements of the tissues lie.

At other times however inflammation forms a very serious danger, imperilling the system without any apparent useful purpose. Inflammations are not only distinguished by their objective characters, but also by the property which they have to produce general disorder of the health of the patient, and in their turn to be injuriously affected in their progress by the disorder they have themselves produced. For instance, pneumonia is often, especially in the chronically enfeebled, a simple unmitigated danger to life. Under other circumstances there is much reason to believe, that the process known as pneumonia is really not the disease but the process of repair. As in bronchitis, some occult injury has been received, which the inflammatory process alone will or can compensate, or cure. Put a grain of sand into the eye, and soon there is not only a flow of tears from the effect of the irritation exciting the lachrymal gland into functional

activity, with the result at times of effecting the removal of the irritant; but the vessels of the conjunctiva undergo a process of dilatation, and there is an increased blood-supply to the part and additional cell-formation. The design, if such expression may be permitted, is not destructive and mischievous, but benevolent. If the case were quite successful, the grain of sand would be encapsuled in a mass of lymph—unfortunately, however, the delicate structures of the eye are generally destroyed in course of the process. The inflammatory process often needs the guiding hand of man; indeed the disturbance occasioned by it is frequently a source of much danger. Equally too the benevolent but misdirected zeal of man often ends in the death of the patient; and the attempts to regulate the course of the inflammation destroy the life of the organism. If Nature does not always work wisely and well, if her attempts sometimes are too energetic, the same charge can be equally substantiated in relation to the efforts of man. When inflammation was regarded as a raging demon to be felled at once, no matter what the risk incurred by smiting it, the efforts of the medical man had to be, above all things, energetic and decisive. Then it might be said with some reproach to truth, that nature and disease were two men fighting, and the doctor was a blind man who struck with a club, and cut down either the disease or the system. At present, however, more correct notions obtain; the inflammatory process has been followed up and tracked to its furthest retreats by a legion of industrious workers, and been found to be almost a physiological action. As we have just seen, it is often really benevolent—the natural process of repair. We now know that there is no sharp line of demarcation to be drawn between that process of increased nutrition which develops masses of horny epidermis on the hands of the workmen, and the process which disturbs the valves of the heart; nor yet even between it and the inflammatory action in the lungs which so frequently closes the career of pyæmia. After all, they are processes of increased nutrition, which differ in degree rather than in kind. Unfortunately the function of the lungs is so important, and essential to the existence of the organism, that the extensive changes set up throughout them kill the patient; and an effort benevolent in itself becomes directly destructive. In the same

way we must look at inflammation in order to clearly comprehend how it is that it so commonly occurs under circumstances of lowered vitality; how it is that the impaired condition of the system generally is so associated with these local disturbances of nutrition, that the inflammatory process is ill-controlled, and becomes a source of danger instead of a reparative action.

We are not yet sufficiently acquainted with the actual processes of nutrition to understand the relations positively existing between the tissues and their blood-supply. We do not yet know how it is that the combined action is instituted which we recognize and denominate inflammation. Whether there is merely a disturbed condition of the innervation of the blood-vessels of the part, leading to hypervascularity and consequent cell-formation; or whether there is a starting-point located in the tissues themselves, which casually induces the vascular changes; we do not yet know, and can only surmise. There are grounds for believing that blood-vessels have not only their vaso-motor nerves, derived from the organic nervous system, which produce contraction of the muscular wall of the blood-vessels; but that there are cerebro-spinal fibres as well, which inhibit the vaso-motor nerve-action and dilate the vessels. When a part is much exercised the vascular branches of its nerves—the trophic fibres of its motor-nerves—are thrown into action with the rest of the nerve-fibres, and we have as results the well-developed calf of the ballet-dancer and the muscular arm of the blacksmith. When a motor-nerve is irritated the blood-vessels of the muscle involved are dilated. This dilatation of the vessels follows the irritation of the nerve even when the muscle itself is paralyzed by curare. It is apparently in the relation of the tissues to these trophic nerves that we see the commencement of the inflammatory process in its most normal aspects, as in the healing of an amputation. Where the starting-point, and what the initial action in visceral inflammations is, we must candidly admit that we do not yet know. We can only trace the action going on after disturbance of the blood-vessels has commenced. The dilatation in increased blood-flow, the retardation of the flow, the ultimate stagnation, the cell-formation outside the minute blood-vessels are described and pictured in a legion of works on physiology. Not only is

there a local process going on, but the action on the blood-vessels extends to the whole circulatory system. There is general vascular excitement: but at the same time, the nearer the inflamed spot the greater the effect. Thus Lawrence found in a case of whitlow, that on bleeding from both arms the blood ran much faster from the arm connected with the inflammation.

The constitutional state which is associated in this twofold way with inflammation as its product and its cause, exhibits variations which do not always correspond either with the extent or even with the intensity of the local process which it accompanies, and receives names which express that variation. It may be admitted that in all cases inflammation, if of considerable extent, is attended with fever; but there is a marked difference between the slight febrile disturbance which accompanies healthy suppuration and the degrees of general disorder which are expressed by such terms as "irritative fever," "pyæmia," or "septicæmia." These three, or the constitutional states that are associated with them, pass into each other by insensible gradations, but are separated from health by a line which has become much more easy to define practically at the bedside since the thermometer was introduced into every-day use as an aid to clinical observation.

§ 46. In inflammation there is great local vascularity, increased cell-formation, and local evolution of heat. The old phrase, pain, heat, redness, and swelling, gave a fair idea of the pathological changes going on. But this local action is not without effect upon the system generally; and it is with these systemic disturbances that we are here chiefly interested. Any operative and purely surgical measures are not included in the scope of this work; they would be out of place even if we were successful in putting them correctly. Nevertheless an inflammation which best illustrates the different measures to be employed will be found in the surgeon's domain, and consequently a little poaching may be permissible for once. Take tonsillitis, or a whitlow, for instance. There is first local congestion, hypervascularity, swelling, with pain, tenderness, and heat. Then there is the formation of pus, and after its evacuation the process of repair. There is also much constitutional disturbance. The pain interferes with sleep. There is general

vascular disturbance and a feverish condition of the whole system. The appetite vanishes, the tongue is furred, there is much thirst, the bowels do not move, the urine is scanty and high-coloured, there is general languor and muscular lassitude, while the head is not uncommonly hot and painful. The secretions and excretions are deranged.

To distinguish those inflammations which produce grave constitutional disturbance and secondary lesions, by an expressive word, we call them *infecting*. In using the term we are guided by the same criterion as those on which the surgeon bases the practical distinctions above referred to. An inflammation which is more or less exactly limited in duration and extent by the limits of the injury which has caused it, may, with scientific precision, be designated a simple or normal inflammation. An inflammation which spreads and endures beyond the direct and primary operation of its cause, which induces similar inflammations in other parts, and disorders the vital functions of the whole body, has in it something beyond the effects of the injury, and may properly be termed *infective*. Thus infectiveness is marked by two sets of characteristics, one relating to what occurs at the original seat of inflammation, the other to the induced effects which manifest themselves elsewhere. Of the two groups of phenomena it is obvious that those which are removed from the seat of action claim most attention, for they afford evidence that material must have been discharged from the original focus, either by the absorbents or the veins, into the circulation. They consist partly in the springing up of new foci of inflammation along the course of the infected channels, partly in the occurrence of changes in the physical and organoleptic characters of the blood itself, of such a nature as to show that it is impregnated with the infective poison.

Now what are the measures to be adopted to relieve this condition? The first indications are to lower the temperature and the vascular excitement. To attain this end most persons would select acetate of ammonia, as it is diaphoretic and cooling. Others again might choose nitrate or citrate of potassium, or effervescing mixtures; while a third might have a preference for sulphate of magnesium, and utilize the cooling effect of

purgation. Any of these measures might be adopted with good results. Even the simplest form of getting rid of superfluous heat, the cold bath, might not be at all a bad measure to adopt. The thirst would probably indicate cool beverages, which would dissipate or neutralize so much heat. If the fever were high, and the skin burning, a little tartar-emetic might not be out of place. There is also the pain to be taken into account. It is not usual to employ opium constantly in such a case, though it might be resorted to in some cases with benefit. A dose of it is commonly given at bed-time to try to secure some sleep. To be effective it must be given in a full dose. A grain and a half or two grains of opium, with three grains of calomel and five of James's powder, might be given at night, and a Seidlitz powder, or a dose of Hunyadi Janos in the morning. The opium would at least soothe if it did not procure sleep. Then there might be a mixture of this kind given every six hours:—

℞ Vin. Antim. ♏xx.
Tinct. Hyoscyam. ʒss.
Liq. Am. Acet. ad ʒi.

Another might prefer to use aconite, or even hydrate of chloral. It would lower the vascular excitement, both in its action on the heart and the peripheral vessels, especially of the skin; it would act to some extent on the nervous system, and modify the sensations of pain and the headache. It might be combined with opium, thus:—

℞ Chloral Hydrat. gr. xv.
Tinct. Opii, ♏x.
Mist. Camph. ad ʒi.

every six hours. A dose of Plummer's pill, with a grain of opium, at bed-time, and a saline laxative in the morning, would be of service. Such would be the plan of treatment during the rise of the inflammatory process. Or the chloral hydrate might be combined with scruple doses of bromide of potassium.

If it were a viscus that was inflamed, say the lungs for instance, another therapeutic measure might be brought to bear. This is to reduce the bulk of blood either by venesection

or by its equivalent—bleeding the patient into his own vessels. To do this it is necessary to increase the general vascular area. All agents achieve this end which dilate the blood-vessels, as antimony and aconite. The more the blood-vessels are dilated the less the blood-pressure on the inflamed part. The vessels of the inflamed area are already dilated, and so there is no local action to be feared in the use of the depressants of the circulation, which usually lower the heart's action while dilating the peripheral blood-vessels. A further enlargement of the vascular area is achieved by dilating the vessels of the skin by the application of heat. A large jacket-poultice dilates the vessels of the skin of the trunk to such an extent that effects similar to venesection are produced upon the blood-mass; while the blood remains within the organism, and is still available for future needs. Its effects are seen in the relief afforded by such poultices in cases of inflammation of the lungs, or cardiac dyspnœa where the right ventricle is gorged to distension. Such a method of affecting the circulation would scarcely be suited to a whitlow. If a knee-joint is inflamed, the plan of ligaturing the femoral artery, and so shutting off the blood-current at the main, is at once rational and successful in practice.

§ 47. A whitlow, though an excellent example of simple inflammatory fever of local origin, is not the best example that could have been chosen for illustrating the type of ailment, with its appropriate treatment, which intervenes betwixt the inflammatory rise and the true convalescence. During this period there is still some constitutional disturbance with an oscillating temperature. An example of what is meant is furnished by the condition formed in an abscess, when the tension and extreme pain, with accompanying constitutional disturbance, are relieved by a surgical incision, or the bursting of the abscess spontaneously; and there is left a free discharge of pus, with some general irritation and an irregular temperature, or evening hectic. After a whitlow, or tonsillitis, the course of which is very identical, the relief afforded by the escape of the imprisoned pus is usually sufficient to at once admit of sleep, and a returning appetite; but where this is not the case, and there is an interval between the inflammatory

rise and the convalescence proper, a modification of the treatment is necessitated. The direct depressants of the circulation are to be laid aside, having served their turn—and often well,—and a line of treatment is to be instituted which is tonic or stimulotonic, and yet calculated to control any tendency to temperature disturbance. Such measures we shall find in the union of mineral acids with vegetable tonics. Nitric, muriatic, or phosphoric acids in combination with cascarilla, cusparia, gentian, or calumba, and still more quinine, are good measures. Any tendency to constipation could be met by a dose of sulphate of magnesium, either in the form of mineral waters or in some pharmacopœial preparation. A good form of combination of acid and tonic is furnished by the following prescription:—

Ac. Hydrochlor. Dil. ℥x.
Inf. Cinchon. Flavæ, ad ℥i.

or might be varied in this manner:—

Quin. Sulph. gr. i.
Ac. Hydrochlor. Dil. ℥x.
Inf. Cuspariæ,
Aut Cascarillæ, ad ℥i.

This might be given three or four times a day. By such measures the tongue cleans, the appetite returns, the skin becomes moist and cool, the bowels begin to move again; and that convalescence is steadily approached which will require a special treatment—meet and suited to its wants.

Ere proceeding, however, to discuss the period of convalescence, a few words as to the diet suitable to the first and second stages of inflammation may be not altogether out of place. The loss of appetite which usually marks conditions of pyrexia, especially when accompanied by sharp pain, and the condition of the primæ viæ indicate that any food taken at the time should be of a bland and non-stimulant character. The digestive power is so feeble that any solid food is out of place. At the same time a certain amount of food, of force-bearing food or hydrocarbons, is much more indicated than is at present thought: if

judged by the prevailing treatment. In it beef-tea and its congeners take a foremost place. In reality, however, there is nothing of actual food in beef-tea, or solutions of Liebig's extract. They form agreeable and grateful beverages, but they are rather stimulants than true nourishment. The cups of beef-tea which are now so sedulously administered to the sick, in all stages from the *malaise* of commencing fever to the establishment of convalescence, are a measure of questionable utility. They procure a sense of "feeling better" after their introduction into the system. But this often serves no good end. The feeling is procured by borrowing so much of the reserve strength of the system, which might more wisely be economized till the hour of need. Such practice is a part of that meddlesome officiousness which must always be doing something. Such interference often takes its origin in the bustling mischievousness of a self-satisfied relative, in the ignorant though well-intended suggestions of an anxious pater-familias; and not rarely in a desire to please the friends and relatives of the sick person on the part of the medical attendant, who feels it safer to follow the fashions of the day than to map out a distinct and rational plan of treatment and to stick to it. As our knowledge progresses it seems more and more probable that systematic plans of treatment will largely supplant the present plan of treating symptoms, or groups of symptoms, as they arise, and of varying the medicines and the food according to some passing phase in the case itself.

In supplying food it should be at once bland, nutritious, and easily digestible. Such a combination is found in milk and seltzer-water. This forms a pleasant and supporting beverage. It can be easily and readily chilled by the addition of ice. When so chilled it is a febrifuge medicine, destroying so much heat. Iced lemonade forms a pleasant beverage. Some persons cannot take milk, and then it is necessary to fall back on something else. Lemonade and claret might be given, as a beverage; and a cup of beef-tea may be given, or blanc-mange, or chocolate in a fluid form. The coffee and milk now procurable in tins, may be prepared according to directions, and be permitted to cool ere being given. Vogel, in his work on *Diseases of Children*, recommends coffee as a useful stimulant in

the ailments of children: with good milk or cream it is a good food in conditions of depression. Water, aërated or otherwise, can be administered, usually without stint. It may be chilled or acidulated, or both. Water in which rice has been boiled, may be used as a combined food and beverage with advantage. The question of how far alcohol is useful in the first stage of the fever-rise, may well be raised. The action of the alcohol on the heart while the skin is dry and burning, perhaps forms a strong objection to its use, as tending to raise the temperature still farther. When the first stage is over, then alcohol may be resorted to usefully. It may be used at bedtime as a hypnotic instead of the opium, or Dover's powder, which are better suited to the first stage. Its action on the skin lowers the temperature and conduces to sleep. It may be given along with portions of food, and both stimulates the digestion and spurs the appetite. As a food it is readily available; as a stimulant it promotes the processes of assimilating food for the body-needs. It is a grateful beverage, and a valuable auxiliary in the treatment of sub-febrile conditions, especially when subsequent to acute pyretic states. In the form of the brandy-and-egg mixture of the Pharmacopœia, alcohol is very serviceable in these conditions, and even in the more advanced stages of a typhoid condition. As the convalescence becomes established the dietary may be varied, and the more ordinary forms of food added. Little allurement in the nature of the viands is required to tempt the appetite in convalescence from acute disease; it is usually eager and active, and plain food is taken with avidity, and large quantities are digested and assimilated with surprising ease.

§ 48. The general plan of treatment of inflammatory states may be aided by local applications of heat and moisture. Linseed-meal poultices are grateful and beneficial, especially when there is local suppuration. They are also good in pericardial and pleuritic inflammations. In peritonitis they are too heavy; here hot cloths sprinkled with turpentine or laudanum, or both, are often of the greatest service. At other times, lead, acetic acid, and opium are very useful. In the inflammation often found in a bruised or injured part, cool and evaporating lotions, or a constant dripping of cold water, are most serviceable in moderating

the excessive reparative action, otherwise known as inflammation. Local bleeding, cupping, or leeching, are often very desirable in controlling localized action, and in moderating the vascular fulness. In mammary abscess belladonna ointment smeared on the breast often gives great relief. Some remedies used by quacks and old wives are not without value, and mallows, turnips, and carrots boiled, mashed and made into hot poultices, often give much relief, especially in inflammation of the veins. The "drawing" qualities ascribed to various remedies of this order by the vulgar are not demonstrable, nor is the confidence reposed in them by the laity as to this power enjoyed by the profession.

§ 49. Sooner or later a period of convalescence is established, and there exists no longer a sub-febrile temperature. The process of healing goes on triumphantly from this point. There is undisturbed sleep, a restored appetite with a renovated digestion, and a recovery of the body-weight, until the pre-existing weight is again reached, or even exceeded. The different functions of assimilation, of secretion and excretion, are once more acting with unimpaired vigour, and the pristine integrity of the system is recovered. Such is an ideal progress; commonly a less perfectly satisfactory state of matters exists. At these times there may be impaired functional activity and loss of tone. The food taken may seem not to benefit the patient, or there may exist much torpor in the gastro-intestinal canal. For the latter a dose of medicine, containing more or less of a mercurial in combination with laxatives, is indicated. Especially is this the case where there is a furred tongue, the fur having a yellowish tinge, and there co-exists a foul taste in the mouth on awaking (under such circumstances the addition of a small dose of a mercurial is indicated). If the appetite is capricious and assimilation imperfect, then a combination of vegetable tonics and iron, with or without mineral acids, suggests itself as most appropriate. Consequently a mixture more or less like the following will be found advantageous:—

℞ Tinct. Fer. Perchlor. ℥v.
Ac. Hydrochlor. Dil. ℥x.
Inf. Calumbæ, ad ℥i.

three times a day, half-an-hour before meals. If the mixture is palatable and grateful probably it will do good. If the palate rebels against it, it will be better to change it for something else. Citrate of iron and quinine, in a bitter infusion, may be indicated instead. The bitter acts beneficially upon the stomach; the tonic action does good generally; while the iron helps in the blood-formation. Such combinations, then, are very serviceable, and if the bowels be inactive merely, with a fairly clean tongue, a pill of aloes and myrrh at bed-time every night or every second night will be found sufficient to keep matters going straight. A gentle action on the bowels is almost always useful at the commencement of a course of chalybeates. It often happens, too, that the combination of a vegetable tonic with iron does not quite agree with the patient, and each dose is followed by a disagreeable sense of feverishness, or, as the patient says, "the medicine heats me too much." Here the addition of a little sulphate of magnesium will usually meet the emergency.

Magnes. Sulph. gr. xx.
Quin. Sulph. gr. ½.
Liq. Ferri Persulph. ℥v.
Inf. Quassiæ, ad ℥i. ter in die,

forms an excellent and useful combination, where the ordinary quinine and iron mixture do not perfectly agree.

In convalescence it is a great matter to see that it is not interrupted. If it is interrupted, the second progress is never so satisfactory as the first. It is always and invariably slower at the least. This is a matter which cannot be too strongly insisted upon. There are two sources of disturbance to which the convalescent is susceptible, and which are the usual causes of such interruptions; these are febrile conditions from lowered power of resisting changes of temperature, and digestive disturbances. The first is a very common and well-known cause of illness in those recovering from acute disease; and as such is generally well guarded against. Great care about exposure is necessary, and brief periods of exposure often bring on baneful consequences. Any chill, however slight, should at once be met by a well-warmed bed, some hot fluids with alcohol, and

confinement to bed for twenty-four hours. By such means the cold may be kept off altogether; or, if not that, it may be hurried through its different stages, and so be brought to a close in a brief time.

The other source of disturbance is also common, and the rise of temperature is very sharp. It is more apt to happen when the appetite is just becoming brisk, and is the consequence of what our forefathers termed "a surfeit." Here the old-fashioned remedy of an emetic, followed by a purgative, is most efficient. If the form of the disorder is mistaken for cold, and the correct treatment missed, this febrile condition may go on for days, and cause much disturbance and some dismay. It is in children chiefly that this form of ailment is most commonly seen; and any very sudden rise of temperature should always arouse the suspicion of acute indigestion.

Commonly the progress is unbroken, and the patient steadily gains strength and weight. It is often desirable to send convalescents, if in a town, into the country or to the seaside. Excellent effects are usually so secured; but sometimes the change disagrees. Fresh air, good food, pleasant surroundings, and cheerful society, are all good and useful adjuvants to strictly remedial measures.

Such is the progress of a simple, or sthenic inflammation. At other times the convalescence is disturbed by some pathological changes, which will be reviewed hereafter. But it is not in the stage of convalescence only that there are variations from this simple course; the character of the febrile state may be quite different and need appropriate changes of treatment.

§ 50. The most important modification of the progress of inflammation and of its constitutional accompaniments is furnished by what is termed "asthenic" or "low" inflammation. This is an aspect rarely presented by the youthful, the robust, or the rustic. It belongs to exhausted systems, no matter whether reduced by prolonged overwork, fast living, drunkenness, or life in insanitary neighbourhoods. Existence in unhealthy, badly-drained, and worse-sewered districts, amidst an overcrowded population, with foul air and impure water, will produce such modifications in the system, that when it becomes the subject of an inflammatory or febrile affection, it takes the

following aspect:—the pulse is sharp, but unsustained; the temperature is high, but liable to fits of collapse; there is a tendency for the tongue to become furred, and the typhoid condition readily manifests itself. Careful observation of one case in actual bedside practice will teach more—and that too far more effectually—than any information that picture-writing will convey. There is a low asthenic type of disease, once recognized by the eye, never to be forgotten, and needing little description. In the wards of hospitals, with broken-down patients, and in those physiologically bankrupt, such cases are very common.

They are not to be treated by depressants. Such treatment sinks them at once. They require alcohol, ammonia, bark, beef-tea and milk, in liberal and unstinted quantities, and at brief intervals. They do not possess that reserve fund of force, on which they can live during an acute pyretic attack; and consequently the whole plan of treatment has to be modified accordingly. The enfeebled system has above all things to be supported. The most effectual means of influencing the inflammatory process is to endow the system as far as possible with the power to assume the usual control over it. The ordinary plan of treatment has to be reversed, and instead of lowering the general condition in order to depress the inflammatory action, it becomes necessary to improve the general condition in order to affect the inflammatory process beneficially. Instead of antimony we give ammonia; instead of laxatives we give quinine; and instead of slops we give the most stimulating forms of food. Neither is it irrational or illogical to do so. In speaking of this form of inflammation, Erichsen expresses himself with such incisive good sense that he must be quoted verbatim. He says, "It is the type that is effected by this constitutional disturbance, its sthenic or its adynamic character, as indicated by the pulse and the tongue, and not the mere diagnosis of the local disease, that must guide the surgeon in the adoption of his line of practice. We may advantageously treat with antimony and blood-letting acute inflammation of the conjunctiva, or that which is the consequence of a wound of the lung, in an otherwise healthy and robust man of thirty; whilst in a broken man of seventy, ammonia, bark, port wine and

brandy, would be equally proper; but if we were (except under peculiar and exceptional circumstances) to reverse this treatment—to stimulate the young or vigorous and to deplete the aged or feeble—we should act contrary to common sense, and probably destroy rather than cure our patients. It is of far greater importance to be able to estimate accurately the true constitutional condition of the patient, than to be able to form a minute diagnosis of the precise seat, extent, and depth of the local mischief. It is a fatal error, too often committed, to attach too much consequence to the recognition of the local malady, and to attach too little importance to the character of the constitutional disturbance attending it. The surgeon who acts thus runs the risk of treating the name and not the thing. If we treat erysipelas or pneumonia as mere affections of the skin or lung, on one uniform plan, without reference to the type of the constitutional disturbance accompanying it, we shall miserably err in a considerable proportion of the cases. But if, paying but little attention to the local affection, except so far as its characters indicate the general type of the disease, we make the constitution of our patient our guide, and deplete or stimulate according to the state in which we find it, and thus, perhaps, treat two patients with the same disease, so far as name is concerned, on totally opposite plans, we shall not act inconsistently, but in strict conformity to the natural condition of the patient and of his disease."

These words are pregnant with thought, and contain a deep and subtle insight into the actual requirements of patients. To be able to recognize the distinctions given by Erichsen may not be very useful at an examination table; but it is of paramount importance in dealing with actual disease at the bedside. It is the gradual diminution of such power, along with such strict attention to mere physical diagnosis, that is making the more correctly educated student of to-day actually less useful to the sick man than his less perfectly trained predecessor in physical diagnosis—who was, however, a superior antagonist to disease—and so has done harm not only to the profession but to humanity generally.

When the inflammation assumes an adynamic or low type, the treatment must be suited to the change.

Ammon. Carb. gr. v.
Sp. Chloroformi, ℥xx.
Inf. Cinchonæ, ad ℥i.

may be given every four or six hours, with wine, especially effervescing wine, milk, beef-tea, or egg and brandy; and at frequent intervals. The ethers of wine make it specially suitable to such asthenic conditions. Effervescent beverages, such as brandy-and-water with citrate of potash, are of service; and indeed the utmost possible union of stimulants with tonics and nutritious food is indicated, to get the organism through the period of peril which is hanging over it. The typhoid condition will obtrude its grim visage in spite of everything, in some cases; but the faintest appearance of it should always put the wise and thoughtful practitioner on the alert. There is danger hidden behind it, wherever and whenever it shows itself. Its appearance should at once call out our most strenuous and energetic measures.

Such a modification of the ordinary inflammatory process is far from uncommon, and its early recognition, and the consequent adoption of appropriate measures, will form an excellent test of the natural good sense, and of the genuineness of the training of the medical man. If he has so studied disease as to make bedside practice merely subservient to the requirements of examination, it is probable that he will make his observations, and form his conclusions too late to be of service to his patients, or of credit to himself. Too much insistence, it may appear to some readers, is being made here on this power of discriminating between different forms of one morbid change, according to the organism in which it shows itself; but such power is of so great value in actual practice both to patient and practitioner, that it is impossible to lay too much stress upon it—especially in a work designed to enable the student to meet disease as it presents itself in real life, and not in the antiquated types of some examination tables.

§ 51. Such are the commonest forms of inflammation as they reveal themselves to the physician; but there is still another form of inflammation which it is of the greatest moment to fairly comprehend, and consequently to know how appropriately

to treat it. Such inflammation as we will now proceed to consider is excited by the presence of abnormal constituents in the blood, or by the presence in excess of what is quite normal. Under the first heading will come the chest complications of measles, the suppurative inflammation of the parotid glands in scarlatina, and the various complications of small-pox. Under the second heading can be classed the inflammatory processes of acute rheumatism and the numerous inflammations of chronic Bright's disease.

It is at once obvious that in such inflammatory actions—no matter where located, or in what tissue—one great point is to remember their causation and the indications for treatment furnished thereby. If the exciting cause can be removed, the consequential disturbances will vanish, at least in the majority of cases. If the exciting cause cannot be removed, then the case must be treated on general principles directed by the exigencies of the case. In the exanthemata, for instance, we possess no means of evicting or neutralizing the poison, which forms the initial point, and therefore we fall back on general principles, and treat the complication—as it is termed—either as a simple inflammation, in which case the remedies for a pyretic state are those indicated for the treatment of the rise of the inflammatory process; or if an asthenic type be assumed, the line of treatment which has just been indicated as appropriate in such cases, is to be adopted. The character of the inflammation will rarely or never be dissociated from the type of exanthem; and when an asthenic type is assumed by one, the other will be found to present similar indications; for the rash and the inflammation are but part and parcel of the whole, and the measures indicated by the one are the measures best adapted to the other. In other cases, however, the line of treatment to be pursued is that of the condition generally with special reference to the individual cause. For instance, in syphilitic iritis energetic treatment of the syphilis is the best line of treatment of the iritis; and saturating the system with mercury will give the best results. At the same time it must be distinctly understood that even here the type of the inflammation cannot be overlooked. The mercurial ought to be given along with vascular depressants or with stimulants

and tonics, according as each line is indicated by the characters of the case. That is, while a mercurial course is being administered, the appropriate measures are to be combined with it: and according to the system in which the syphilis is, so must be the auxiliary measures with which the mercurial is combined. The syphilitic iritis must be met; but whether it shows itself in a robust youth, or a broken-down constitution, is a matter of importance in selecting the therapeutic measures to be combined with the mercurial.

When the inflammation rests causally upon the pressure in excess of what is normal in the blood, as, for instance, of lactic acid in rheumatism, and lithic acid in gout, the originating cause gives at once a direction to the line of treatment. If pericarditis come on during the course of acute rheumatism it does not necessitate any change in the plan of treatment. It merely indicates the necessity for perfect rest—which includes the avoidance of pulling the patient about in the *nimia diligentia* of diagnostic ardour—and the application of hot poultices persistently and assiduously to the pericardial region, or rather the whole of the front of the chest. Very few men now-a-days —and those only the practical men, who, according to Lord Beaconsfield, are the men who practise the errors of their predecessors—would think it necessary to give calomel because pericarditis had shown itself; no matter how strong might be their views as to the usefulness of mercury in the ordinary inflammations of serous membranes. The salicylate of sodium treatment would be pushed more actively, and fuller doses of opium given than before; that would be the line to be pursued, not any radical change of plan in consequence of the complication, as it must simply be regarded. The condition presented to us is that of rheumatic fever, and the different complications which arise during its course are part of itself, and are to be treated accordingly. If a complication came on, not causally associated with the prevailing disease, as, for instance, a sharp diarrhœa in the course of acute rheumatism, it would be simply stupidity not to treat it with its appropriate measures merely because it occurred during rheumatic fever. The natural common sense must be the director as to whether the complication is a part of the whole, or is an adjunct to be individually arranged with.

To one the relations may be clear and the line to be adopted quite distinct, while to another all is misty and obscure, in which case it is not so well either for practitioner or patient. The known sequences of ailments will give a clue at least in the worst times of diagnostic trouble.

The most unfortunate evidences of the lack of discrimination in discerning between simple and specific inflammations, are unquestionably furnished by the inflammatory outcomes of chronic Bright's disease. Again and again are inflammatory affections, in people of middle age and advanced life especially, treated as simple inflammations; when in reality they are gouty exacerbations with local complications. In the form of bronchitis, pleurisy, and arthritis, we see the outcomes of renal inadequacy. No one would dream of treating gouty inflammation of the great toe as he would treat a whitlow; he would at once proceed on a recognition of the gouty element, and administer colchicum and alkaline laxatives freely. In one respect the treatment would in no wise differ from a simple inflammation, namely, that the inflamed part be kept at rest,—in as near perfect rest as is practically attainable. But if few would make a mistake about gouty arthritis, there are hundreds who would as certainly overlook the gouty element in a case of bronchitis, and in doing so would fail to treat the case satisfactorily.

§ 52. *Parenchymatous Inflammation.*—A most important modification of the nutritive processes is that known as parenchymatous inflammation, which is essentially a cell-proliferation. It consists of an increase in the cell-production from the connective tissue. Connective tissue or basement membrane, is the lowest form of organized tissue. It forms the packing which keeps together the vessels, tubes, and nerves—say of the kidney, for instance. When from any cause there is excessive vascularity in a part, there is an increase of cell-growth, a true hyperplasia. In a muscle it may lead to increased growth of muscular fibre, or hypertrophy. In other tissues the growth is by development of connective tissue, as in the valves of the heart, for instance. In the different viscera this increase in the development of connective tissue is well-marked, where there has been sustained functional activity. Thus there is developed excess of connective tissue in the granular kidneys of the gouty;

where excessive and long-sustained functional activity has led to structural changes. It may be occasioned by repeated local hyperæmiæ, as in the gin-drinker's liver. At other times it arises from venous congestion, as in the increased connective tissue of the lungs, brain, liver, spleen, and kidneys which results from mitral disease and arrested circulation. It would appear that cell-growth may arise from congestion of the venous radicles as well as from arterial fulness. It may arise from local irritation, as in the chronic interstitial pneumonia associated with the respiration of organic particles in the miller, the mason, the potter, and workers in certain departments of woollen manufacture. Or it may be occasioned by functional activity prolonged and excessive. We have seen that much activity of a part is accompanied by an increased vascular supply, probably through the agency of trophic nerves; if this be ill-controlled it may proceed to inflammation. Habitual use or over-stimulation of a part by producing determination of blood to it, may readily drive it into inflammation. So we actually see that inflammation of the aortic valves is a very common occurrence where the occupation, or the voluntary pursuit, leads to sustained high arterial tension, and consequently violent closure of the aortic valves. Thus in men who wield heavy hammers, called strikers, such ailment is very common. Aortic valvulitis is also common in the sustained high arterial tension of chronic Bright's disease: where the valves are closed violently, and so become inflamed. The loud sound produced by the forcible closure of the aortic valves is to be heard during the course of chronic Bright's disease, and is of most valuable diagnostic import. In the same way atheroma, which is really cell-proliferation in the walls of the arterial system, is found locally at points subjected to great strain; or as a general condition in renal disease from the same cause as the aortic valvulitis, viz. over-distension of the arterial system. Such cell-proliferation is the means by which arteries may be thickened when their work is increased; consequently atheroma is usually found along with hypertrophy of the ventricle and similar change of the muscular wall of the arterioles.

Parenchymatous inflammation is nutrition run wild. It is, however, a conservative process originally. When excessive it

becomes baneful, but often it must be regarded as a modification of nutrition far from simply injurious. That it amounts to what we call disease does not militate against the view that it is a mere modification of physiological processes. A pathological process is often but an excessive or perverted physiological process. Such is atheroma.

There is one most important practical lesson well taught us by atheroma. It is this. The process of atheroma is wonderfully modified by the organism in which it is found. If in a hale and so-called healthy old person it will go on for years, undergoing little change, and rarely endangering life, except by apoplexy. In another of broken constitution, and especially if a drunkard, or saturated with syphilis, the cell-products known as atheroma quickly undergo degeneration. The patches on the inner coat of the blood-vessels soften and break down into the *purée* of peas; and washing out in the blood-current, lead to embolism on the one hand, and atheromatous ulcer (*geschwur*) on the other. Each of these actions endangers life; and especially the open ulcer in the arterial walls. At other times, in other constitutions, the atheromatous degeneration is markedly calcareous, and leads to gangrene of the limbs by the loss of arterial elasticity; or forms a serious source of trouble to the surgeon in ligaturing the vessel for aneurism, or in amputation for gangrene. Yet nevertheless in these different cases the essential starting-point is a parenchymatous inflammation, a cell-proliferation of connective tissue elements under the tunica intima: but if the initial process is the same the ultimate course is widely different.

§ 53. The treatment of parenchymatous inflammation is a complex matter. To use the language of Herbert Spencer, we have to adapt complex concatenated measures to complex concatenated actions. The whole of the origin and course of the parenchymatous inflammation must be subjected to a bird's-eye view, and then each part of the whole is seen in true relation to the rest. At the same time each part should have careful special attention given to it and its needs. If it be interstitial pneumonia in a mason working on fine stone, he must leave his occupation and flee for his life. As a police officer, a soldier, or an emigrant he may live: but if he remain a fine-hewing mason

he will surely die; and that too before long. If the striker, or boatman, on the first evidence of aortic valvulitis, quit his occupation and take to some lighter form of labour, he may live to a fair length of days. But if he adhere to what has produced disease in healthy organs, the morbid processes will be aggravated and the end accelerated. If the gin-drinker reform, his injured liver may yet last for years with care. If the gouty man reduce his consumption of nitrogen to what his kidneys, aided by his skin, can fairly eliminate, length of days may not be absolutely out of the question; but such prolongation of life is incompatible with self-indulgence.

The removal, or, if that be impracticable, the reduction to the least possible minimum, of the exciting cause is the first and most important step in the treatment of parenchymatous inflammation. Any especial action of remedies is not very applicable, except when the chronic imflammation is within the surgeon's reach. When so within reach and not complicated with any functional activity, so that rest is attainable, local applications, first of opium, to lower the vascular activity, and then of mercury or iodine to remove certain products, are available. A thickened joint when placed at rest in splints may be reduced by the use of absorbents; but it is quite a different matter with internal changes, where such rest cannot be first secured. Consequently the use of ioduretted or mercurial applications in cirrhosis of the kidneys, valvulitis, or atheroma, does not suggest itself as containing the elements of possible success. This is not therapeutic faith: it is credulity. Rest, physiological rest, is what must be aimed at for recovery and the arrest of the morbid process; removal of the morbid products cannot be attained in chronic changes in the viscera.

Attention to the general health, strict hygienic arrangements, and careful avoidance of the various and special exciting causes will often give very gratifying results in the arrest of parenchymatous inflammation, and in escape from the consequences of the morbid changes.

§ 54. Inflammatory products are not always to be regarded as a disease *per se*. Frequently that proliferation of connective tissue which constitutes an inflammatory product is useful and

conservative. Thus in perforating ulcer of the stomach the products of inflammatory action are often the means of preventing the ulcer opening a passage into the abdominal cavity, which would be fatal. By like means an internal abscess, as of the liver or kidney, may safely make its way to the surface. In cases where disease is disturbed by motion inflammatory products procure rest. This is well seen in the thickening around a diseased knee. By cell growth a certain support is given, as it were by a natural splint; at the same time that the stiffness, so occasioned, aids to limit movement in the joint, especially in connection with the pain elicited by motion and friction of the diseased surface, or surfaces. In a broken limb we see first a general infiltration of the part around the fracture; and then a growth of cells from the periosteum known as callus. The less perfectly the part is kept at rest the greater the call for these conservative efforts; the more perfect the treatment the less the necessity for the reparative and protective processes of Nature. It is always desirable to limit as far as possible any excess in these natural efforts, as the new growth, having served its turn, may itself become a source of trouble, or be unsightly. Thus, for instance, in strumous inflammation of a joint the thickening which conduced to give rest and limit motion, and so saved suffering and favoured reparative action, may remain an eyesore, if not actually troublesome; consequently it becomes desirable to exercise a certain amount of control over such growths, and by reducing the necessity for them to a minimum, to get their good effects without the drawbacks. If a fractured limb is carefully and skilfully placed at rest, there is often no more new growth than serves for efficient repair, and in a year or so the point of union may no longer be detectable: if perfect rest is unattained, or unattainable, a mass of callus will mark the site of the injury. If strumous, or other inflamed joints are put in perfect rest in splints, or leathern or other appliances, the cell-growth, or natural splint, is limited, and is ultimately so slight as neither to occasion impaired utility nor even deformity. The inflammatory products are not to be regarded as hostile, but rather as friendly if indiscreet allies. They require guidance, and then they are beneficial; if un-

regulated they are apt to become excessive. The great point is to limit their growth; once established, they are apt to be unmanageable. Rest, pressure, and the use of absorbents will frequently aid the natural process of absorption, which is often spontaneously instituted after the necessity for the new growth has passed away, and in a number of cases the deformity is by these measures much reduced.

In spinal disease, whether lateral or antero-posterior it does not matter, the vertebral column yields under the superincumbent weight of the head and shoulders. This may occur from rapid growth in the vertebral column or from the increased weight of the developing bust. It is most common in girls. All the attempts of surgeons and mechanicians to push the spine straight by lateral pressure have failed, taken as a whole. Dr. Lewis Sayre has pointed out the elements of failure in these incorrectly devised plans. Further, he has demonstrated that the correct plan of treatment is to take the superincumbent weight off the weak spine by means of an external skeleton. The patient is hung by the armpits, and the weight of the body pulls the spine straight, or at least straighter, even in the worst cases: cambric bandages prepared with plaster of Paris are then carefully applied, and the body kept hanging until this corset is dry and firm. When this is accomplished the weight of the head and shoulders is borne by the external skeleton resting on the pelvic girdle; and the spine so relieved grows healthy and strong.

In spinal caries, as Mr. Tubby (*Deformities: A Treatise on Orthopædic Surgery*) has pointed out, the principles of treatment are three in number: to fix the vertebral column and to place it under the best possible circumstances for healing: to remove the weight of the upper part of the body from the diseased vertebræ; and to prevent as far as possible unnecessary deformity by supporting the trunk. To carry out these principles, there are two methods at our disposal, viz. recumbency and the use of retentive appliances. They may be employed separately or in combination in individual cases, but can never be used indiscriminately. In lateral curvature of the spine the chief cause of the perpetuation and increase of the curve is the superincumbent weight of the head, neck, shoulders,

and upper part of the trunk, pressing upon a part of the spine where the muscles are so enfeebled as to be unable to maintain the segments in their proper positions. The correct plan of treatment is to give the weak muscles rest by partial recumbency and by means of supports to assist them in the maintenance of the erect positions. Afterwards, exercises, which are so planned as to increase the strength of the enfeebled muscles, may be carried out. For details the reader must consult Mr. Tubby's valuable work on this subject.

CHAPTER VI

ANÆMIA—PLETHORA—CONGESTION

§ 55. THERE are various states of the system depending upon an insufficiency, an excessive amount, or an irregular distribution of blood, which are of much importance in practice. The first two form general conditions of the greatest moment when dealing with many affections; the third is also a condition of much importance, and stands in such relation to each of the foregoing that it can only be properly considered after the first two have engaged our attention.

Anæmia.—This is a condition of general diminution of the bulk of blood. It is a condition which occurs commonly in connection with blood poisons, and it is found along with syphilis, gout, lead poisoning, and malarial infection. It may arise from imperfect supplies of food, from starvation, or it may take its origin in mal-assimilation, in impaired digestion. At other times it is due to drains upon the system, as lactation, menorrhagia, or leucorrhœa, chronic diarrhœa, hæmorrhoids; or the growth of a malignant tumour, robbing the system to promote its own increase. In the first cases there is a poison existing which either breaks down the blood-corpuscles, or hinders their formation. In the second series the blood is not sufficiently fed by the nutritive processes. In the third there is a drain upon the system which is impoverishing the blood. A proper recognition of the causal relationships of anæmia is of the utmost value in giving the right direction to the remedial measures. It is of little use to give hæmatics to a menorrhagic woman, whose system is simply drained every three or four weeks; if at the same time measures are not taken to check

the drain. Very often, indeed, it is a more successful line of practice to stop the blood-loss, and so permit of blood accumulation; than merely to build up so much blood to be periodically lost. The one substitutes a steady progress for the violent oscillations of rapid blood-formation, alternating with severe losses; which is induced by the other. Especially is such plan desirable in stout women given to rapid blood-formation.

Red blood corpuscles are orginally formed from colourless cells outside the blood-vessels. After birth the formation of red corpuscles in man is confined to the red marrow. There is an entire absence of clinical and experimental evidence as to the production of red corpuscles in excess; at all events, there is nothing comparable to leucocytosis or leucocythæmia in the case of the red corpuscles.

Anæmic persons are not necessarily spare. Chlorotic girls often become very fat. At the same time there is much lassitude, drowsiness, muscular inertia, defective secretion, and general loss of tone. Every organ feels the lack of arterial blood; especially does the brain feel it. With the large amount of blood normally in the encephalon and its rapid flow, a condition of anæmia, with defective circulatory force, is soon felt by the contents of the cranium. The sense of energy, so delightful to all, is gone; and languor takes its place. The person is drowsy when up, and feels as if he (or rather she) never could sleep enough. In bed, however, the rest is broken from the blood flowing more freely into the brain when the head is laid upon the pillow. Consequently it is no uncommon thing for such patients to sleep almost propped up in bed. There is a great tendency to neuralgia, which may be cranial, facial, or intercostal. "Pain is the prayer of a nerve for healthy blood," wrote Romberg; and very commonly it is so. When the pain is intercostal it is usually found in the sixth or seventh intercostal nerve of the left side of women. When so found it is generally associated with suckling, or with discharges from the genitals, and usually with leucorrhœa. Where there is pelvic irritation it would seem that the nerve currents coming up the splanchnics especially affect the spinal nerves, springing off at the point of entry of the greater splanchnic into the

dorsal ganglia. From each dorsal ganglion pass fibres to the intercostal nerve, and in some occult way the sixth and seventh intercostal nerves become the subjects of neuralgia in uterine, or ovarian irritation. Such neuralgia rarely yields to general treatment, unless the reproductive system be also attended to, and the drain, whether leucorrhœa or suckling, be arrested. Neuralgia, or, in others, pain in the vertex of the head, are the scourges of anæmic women.

Palpitation is a common occurrence in states of anæmia, and arises chiefly from nerve disturbance. The roots of the vagus nerves are imperfectly supplied with blood, and consequently, the vagus cannot exercise its wonted controlling, or inhibitory, action over the heart. As the bulk of blood increases, the palpitation vanishes. Hæmic murmurs, either aortic or pulmonary, are very common; but ought rarely to be mistaken for the murmurs of organic change. The veins often give out a hum, the *bruit de diable*, which is commonly regarded as the most marked physical sign of anæmia. These murmurs of the circulation are very common in conditions of impoverished or diminished blood-supply; they are very curious, but their origin is scarcely yet established.

Breathlessness upon exertion is a very common phenomenon in anæmia. It is not due to debility in the diaphragm, the respiratory muscles, nor yet in the right ventricle. These different factors may have some influence, but they do not form the essential matter. The real source is the diminished amount of red corpuscles, and the impaired chemical interchanges resulting therefrom. The supply of oxygen is too imperfect for exertion and effort; and if these are attempted breathlessness follows. Upon this condition of diminution of blood corpuscles and defective oxygenation depends also the fatness so often found in the anæmic, and especially in the chlorotic. These pallid, pasty creatures often become very obese; becoming paler, more languid, and breathless as they wax fatter. The fact is that they grow fat from lack of blood corpuscles to supply oxygen to burn their hydrocarbons, and the fuel becomes deposited as fat. As they recover from their anæmia, and regain the bloom of health, their stoutness diminishes, until they once more possess their pristine symmetry. Not uncommonly the

colouring matter of the corpuscles, dissolved in the hydræmic blood, is deposited in the areolar tissue, as in the dark suborbital patches of anæmia, and the general staining of the skin in chlorosis; or passes away in the urine as urohæmatine.

When anæmia is marked it not uncommonly happens that there comes on œdema of the lower extremities. It is most marked at night, and is relieved by resting in bed; and the swollen ankles of the evening, on getting out of bed in the morning, present a normal appearance. Here the œdema is due to fulness of the venous radicles and atony of the circulation. It also disappears with improvement in the condition of the blood.

§ 56. The indications for treatment furnished by anæmia are varied and important. It is obvious enough that the measures indicated are those which will tend to restore the condition of the blood to the norm. Animal food, soups and broths, are indicated in small quantities often repeated. Farinaceous food alone is not desirable. The blood must be built up by an increase in the formation of blood corpuscles. In order to secure this the diet must be fairly rich in nitrogen. It is desirable that it be of a stimulating nature, and it may profitably be combined with wines of a generous character, as burgundy, port, or madeira. Exercise in the fresh air, cheerful society, and glancing sunlight are all valuable auxiliaries. Not uncommonly, the anæmia will assume a phase of the most obdurate persistency, and defy the best-laid schemes of the medical adviser. Under these circumstances a residence at a chalybeate spring is certainly indicated, and Bath, Tunbridge Wells, Harrogate, Gilsland, Moffat, at home; and Carlsbad, Kissingen, Homburg, Schwalbach, Pyrmont, Tarasp, or Orezza, on the Continent; and Ballstown, New York, or the Rawley Chalybeate Springs, Virginia, may be resorted to with advantage. The amount of dilution is a matter of the greatest moment in attempting to bring the system under the influence of chalybeates in many cases. This fact alone often makes the difference between failure at home and success at a spa. At the same time the change of place and scenery, the psychical impulses so inspired, and the direction given to the thoughts are all very useful. The habits of others at these chalybeate springs often form a great

incentive to invalids, who are inclined to be despondent, to exert themselves and so to aid in their own recovery.

At the same time it must be remembered that very commonly anæmic patients are most difficult to manage from the effects of impaired nutrition on the brain. As soon as ever the blood is at all enriched, severe headaches come on and harass the patient extremely. There is often, too, such cerebral excitement that some depletory measure seems indicated, and relief is not uncommonly brought about by bleeding from the nostrils. Many writers have drawn attention to these consequences of too suddenly filling the cerebral vessels with blood. Nothing is more common than to find anæmic patients complaining of headache from the administration of the necessary tonics, because their nerve-centres have been brought into such a state of hyperæsthesia by the impaired nutrition that they can hardly tolerate anything of a stimulant nature. A little excess, therefore, even of spanæmic blood, may cause distress to a feeble brain, which, after it has acquired a more healthy tone, will bear and be benefited by a much larger amount of much better blood. The case is similar to that of the starved man, whose very preservation depends upon his being fed most sparingly for a time. In such cases chalybeates may be combined with bromide of potassium, as they are commonly united in the treatment of melancholics.

Potass. Brom. gr. x.
Ferri Pot. Tart. gr. v.
Inf. Quassiæ, ℥i. ter in die,

is a good combination under such circumstances. At other times these effects of debility of the nervous system—where irritability is so associated with adynamy—may be obviated by the combination of purgatives with the hæmatics or tonics. At other times lighter forms, as the ammonio-citrate of iron in some bitter infusion, may be given, and the bowels acted upon by saline purgatives, or an aloetic pill. Where the anæmia is associated with amenorrhœa it is very desirable that the iron and aloes be given together. Griffith's mixture with the compound decoction of aloes forms a good combination. It is, however, only suitable to be given before food; and it is a golden rule that

iron, as a pure hæmatic, should be given after food and digested with it. Iron in pill with an aloetic purgative, is here indicated. Arsenic may be conveniently added. The following form is a capital combination:—

Acidi Arsenios. gr. i.
Ferri. Sulph. Exsic. ℥ ss.
Pulv. Pip. Nig. ℥ i.
Pil. Al. et Myrrh. ℥ ii.
In pil. LX. div. i bis in die.

Each pill to be swallowed shortly after food. Half a drop of Ol. Sabinæ is an excellent addition in amenorrhœa—an addition now too rarely made.

§ 57. Where anæmia is found with some specific poison, it is necessary to neutralize, to destroy, or to eliminate the poison by some agent which exercises a specific action upon it. It is here of as much importance to meet the specific poison by its antidote, as it is to use hæmatics. This subject has been referred to before, and so need be but briefly alluded to now. Often, however, there are drawbacks in the remoter effects of the antidotes themselves; and then it becomes very necessary to obviate these secondary actions of remedies whose primary action we wish to secure. For instance, in using mercury for the treatment of syphilis, the effects of the mercury upon the organism are often far from pleasing. What then is to be done? It is obvious that the mercury is to be used for the treatment of the syphilis; consequently the effects of the mercury which are not desired, but which are unavoidable, must in their turn be met by the administration of good food, of iron, and if necessary, of cod-liver oil. Such a plan of treatment is indicated in children where there exists a condition of anæmia, or of impaired evolution, often taking its origin in the action of an inherited syphilitic taint. In other conditions of specific anæmia—as these anæmic conditions depending upon the presence of some blood-poison might properly be denominated, in order to distinguish them from the other forms of anæmia not so occasioned, and which may fairly be termed simple anæmiæ—similar plans are indicated.

At other times anæmia may be associated with some

profound impression made upon the nerve-centres, or the nerve-centres may be the parts most seriously involved in the general anæmia. Sometimes anæmia is the result of shock or mental disturbance. What is the true pathology of this condition, and what the effect of the shock upon the assimilative apparatus, it is impossible in the present state of our knowledge to say. Whatever it is, its action is enduring. At other times the condition of anæmia is much relieved, and the general nutrition is good, and yet there remains an anæmic condition of the brain. The person, usually a girl, is still drowsy and listless, and her lack of energy is commonly attributed to indolence. Indolence it may be; but how comes it to be there in the midst of returning health? It depends upon an imperfect supply of arterial blood to the cerebral centres; and when such condition remains the administration of iron and quinine must be long continued. Whether it is that the cerebral cells have not regained their pristine power of attracting blood at will, and in sufficient quantity, or that the blood supply is itself defective; it is clinically certain that iron and agents which exercise a decided action upon the nervous tissue should be still continued, until the lingering cerebral anæmia is successfully combated, and a feeling of energy is once more present.

In the treatment of pronounced anæmia in girls, especially in chlorosis, it is good practice to send the patient to bed at the commencement of the treatment. Improvement will often set in after the patient is confined to bed, under the same remedies that failed to do good before, while she was engaged in her usual avocations.

A very remarkable form of general anæmia occurring without any discoverable cause was described by Addison in 1855. In these cases there had been no previous loss of blood, no exhausting diarrhœa, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, or malignant disease. To this form of anæmia he applied the term "idiopathic," to distinguish it from the commoner forms in which there existed more or less evidence of some of the usual causes or concomitants of the anæmic state. In 1868, Biermer of Zürich re-described this condition under the name of "progressive pernicious anæmia."

Idiopathic anæmia differs widely from chlorosis in its range with respect to age and sex, many of the patients being men of mature age. The disease commonly, though not invariably, terminates fatally, and at the autopsy no organic disease is found that could properly or reasonably be assigned as an adequate cause of such serious consequences. It must be admitted that the term progressive pernicious anæmia is an unfortunate one, for the terms progressive and pernicious are apparently used in different senses by different authorities. Any anæmia, whatever may be its nature, is by some described as pernicious if only sufficiently profound, and it may be spoken of as being progressive merely on the ground that it terminates fatally. Nevertheless there are good grounds for believing that there is a special disease which differs in many important respects from that form of anæmia with which we are all so familiar. Dr. William Hunter, who has paid much attention to the subject, points out that before we can describe a given case of anæmia as truly idiopathic it must comply with the following conditions:—

(1) That the changes in the blood (as determined by actual examination) must not only apparently but actually constitute the most marked feature of the disease.

(2) That the other chief symptoms of the disease must in great part at least be referable to the altered condition of the blood.

(3) With regard to *post-mortem* appearances, that the changes in the blood, whether alone or in association with changes in the blood-forming (hæmogenic) or blood-destroying (hæmolytic) organs, constitute the characteristic morbid feature of the disease.

The diagnosis of idiopathic anæmia during life will therefore rest upon (1) the detection of certain definite changes in the blood, the changes being more marked than the concomitant change in any other tissue, and (2) the demonstration of a definite relation between these changes in the blood on the one hand and the remaining clinical features on the other: and *post-mortem* upon (3) the demonstration that the special morbid phenomena present can be referred only to disorder of the great processes, hæmogenic and hæmolytic, on which the condition of the blood depends.

In chlorosis, however, the blood-changes, especially the great diminution in hæmoglobin in comparison with the slight diminution in the number of red corpuscles, constitute the chief clinical feature (as in this case also the chief pathological feature) of the disease; they suffice in themselves to account for the remaining clinical characteristics—pallor, debility, giddiness, breathlessness, palpitation, &c., and, lastly, the blood-changes themselves can be shown to depend on disordered blood-formation or hæmogenesis. In pernicious anæmia the principal changes met with in the blood as described by Hunter are (1) the *marked oligocythæmia*, sometimes to a very high degree, and far in excess of that ever found in symptomatic anæmia. This oligocythæmia is in certain cases at least entirely independent of the occurrence of hæmorrhage. (2) The relative *richness in hæmoglobin*, in comparison with the high degree of oligocythæmia which is frequently met with. (3) The presence in the blood of small yellowish globules or *microcytes*, distinguishable by their form and colour from the various other small coloured elements present in all forms of anæmia alike.

The diminution in the number of corpuscles is sometimes extraordinary, and constitutes one of the most marked features of the disease. They are far in excess of those found in the anæmia accompanying wasting and malignant disease. The comparative richness of the blood in hæmoglobin, having regard to the number of corpuscles present, is also noteworthy. What importance should be attached to the presence of microcytes or "Eichhorst's corpuscles," as they are sometimes called, is a matter on which there is much difference of opinion. Although not pathognomonic of pernicious anæmia, their presence in a doubtful case when associated with marked oligocythæmia, affords a valuable indication as to the nature and origin of the anæmia. They mark the anæmia as being due to excessive destruction of blood and not merely to deficient formation; they prove it to be hæmolytic and not hæmogenic in origin.

With regard to the treatment of this remarkable disease, it may be said at once that iron is useless. It is probable that the best results would be obtained from the administration of such remedies as arsenic, phosphorus, and vanadium in full and rapidly increased doses.

§ 58. *Plethora.*—This is a condition which does not loom so largely in the professional mind now as it did a generation or two ago. Whether there is not so much gross feeding now as there used to be—as in the days of old, when Queen Elizabeth's maids of honour had so much beef and beer at breakfast, dinner, and supper; or whether there has some inexplicable modification of the constitution come over us, as some very careful observers assert, it is impossible to say; but plethora is very far from being the prominent subject now that it was of yore. No reader of George Eliot's admirable works of fiction can have failed to be struck by the frequent introduction of medical subjects into her conversations, and by the perturbation of the minds of the subjects of George III. on the important affair of the lowering and feeding methods of treatment. That the opposite method to that which the individual really required, was the one espoused by each in each case; is one of those exquisite delineations of real life which are so characteristic of that gifted authoress.

The most characteristic instances of plethora are furnished by the type of individual which used to be regarded as the apoplectic *par excellence*. Such individuals were short, stout, florid, short-necked, and short-winded. Christmas, as old Father Christmas, is a well-known instance of the plethoric individual. It is commonly denominated the alderman type, and is certainly associated with good living. In fact, plethora depends upon a redundancy of red blood corpuscles. The blood-vessels are full, often turgid, and the capillaries distended. There is usually an hypertrophied heart; but there is rarely palpitation, in men at least. In women sometimes there is a certain amount of dilatation with the hypertrophy, and then there is palpitation. The blood-vessels of the face are dilated, atheromatous, and gorged with blood. Very commonly the arterial twigs are distinct and well-defined. The face approaches in appearance the face characteristic of the old stage-coachman and the modern engine-driver; but with this difference, that in plethora the condition of the face is only that of the vascular system generally. In consequence of their wealth of red blood corpuscles, and their full supplies of nutrition, such persons are generally warm; they withstand cold well, and they do not readily suffer from

exposure. But they are usually somewhat inactive bodily, not always from lack of energy by any means, but from what is understood as fulness of habit. They are to be seen commonly in charge of brewers' waggons, and about breweries; though the type exists in other ranks of life, and in all grades. Such persons are not uncommonly mentally energetic; in fact they are often gouty, with the energy and hasty temperament of the gouty.

There is in such persons a strong digestive power, and a liking for generous food and for alcoholic drinks. The tongue is rarely clean. The bowels may or may not be active; but the motions are always very offensive. The urine is usually laden with lithates, and the liver is often gorged; and bilious purgings, naturally instituted, are not uncommon. The relation of the condition of plethora to the free consumption of animal food is seen in its frequent occurrence in butchers, pork-butchers, publicans, and butlers. In women the same type prevails, and, if very pronounced, gives a bloated appearance. Here its origin is the same as in men. It not rarely happens, however, that such women are the subjects of amenorrhœa; and that too of an obstinate nature. They are commonly sterile; especially if this plethoric condition takes place in early life. Such women are very short-winded, and asthmatic, as they term it. It is, however, little more than the shortness of breath of the obese. They are not rarely the subjects of palpitation. As to their secretions and excretions, they have the character given above.

These plethoric individuals are very subject to apoplexy; it was a mistake, however, to associate apoplexy exclusively with persons of this build and type. The vascular turgescence, which exists, leads to different changes in the circulatory organs. The heart is powerful and well-nourished, in which respect it resembles the muscular system generally. The blood-vessels are well filled, and the blood is driven on by a powerful ventricle. The blood-pressure is high, and an atheromatous condition of the blood-vessels is, sooner or later, induced by the over-distension. It can be no matter for surprise that the thin-walled vessels of the brain often give way in such persons, especially under excitement—when the smaller vessels of the encephalon are dilated, and the current of blood is large, and driven by an

energetic and active ventricle. The association of apoplexy with hypertrophy of the left ventricle was long ago pointed out by Rokitansky; and the observations of that great pioneer in pathology have been corroborated by numerous other pathologists. The strong action of the heart is exaggerated by the condition of the arterial walls, and the pulse is well-sustained, and the arteries are resistant and incompressible. This form of pulse is usually regarded as a typically good one, rather than as illustrating an abnormal form. It is an abnormal pulse, however, and as such must it be regarded. The fulness of the vessels of the face is not unlike the condition of the vessels of the head, and both are but parts of a general condition which is known as plethora; and which requires a certain line of treatment, suited to its needs and adapted to its exigencies. No matter what the form of ailment to be treated in the plethoric, the line of treatment must ever be that which makes the plethora the most prominent and leading object. In some there is much abdominal fulness, with congestion of the liver, and not rarely hæmorrhoids. The discharge from these hæmorrhoids is often most useful, and forms an excellent drain on the vascular system too turgid with blood. Very frequently the disinclination to exert themselves bodily in such persons is marked, and, the appetite remaining good, the plethora is thus aggravated. Often, too, in plethoric females the heart is not equal to much exertion, and exercise cannot be taken; and so the congestion and fulness of the abdominal organs is unrelieved, as it would to some extent be if exercise were feasible.

§ 59. Enough has been said to enable the reader to see that this condition gives distinct indications for treatment. There are two lines of approaching the condition of plethora; both effectual, but neither of them likely to be agreeable to the patient. The one is to diminish the blood-formation: the other is to lower the vascular fulness by measures of depletion. The effect of either plan, in reducing the vascular supply to the brain, is to lessen the sense of well-being, *bien-être*, which takes its origin in a good supply of arterial blood to the posterior lobes of the brain. The free vascular supply to which they have been accustomed makes many of these patients very susceptible to any depletory measures; and they

readily cry out that the plan of treatment is "too lowering." It is this sensation of *bien-être* which has lured them along the path they have taken; and when they feel at all depressed or deprived of energy, they commonly rebel at the treatment. It is not difficult to see that such should be the case. If they feel the better of their food, why should they not go on taking it, is their argument; and as they cannot be supposed to be familiar with chronic pathological processes, they are easily induced to persist in their wrong course. The matter must be explained to them, and they must be made to see that a lessened sense of energy and of feeling well, is directly connected with their future welfare; and that it is undesirable to subordinate the future to the present.

Having taken this precautionary measure, it then becomes expedient, firstly, to diminish their food in quantity, and still more in quality. Such persons like good food and enjoy it, and poor food they are averse from. Their soups are good and their sauces rich. It becomes necessary, then, to alter the character of their viands. Instead of rich entrées they may profitably take a little more fish, and in place of Marcobrunner and burgundy, they should take *vin ordinaire*, or Niersteiner. Port wine after dinner should be avoided, and claret substituted. The quantity too may be reduced with advantage. If the patient be a coachman or a brewer's man, he must be instructed to diminish the amount of malt liquor he takes. There must be a reduction of both food and drink, and the amount taken must be proportioned to the wants of the system, and not to the gustatory tastes of the individual. Rich animal food must be indulged in but sparingly, and those adjuvants to a good appetite, piquant sauces, are quite superfluous. The meat should be plain, so as not to be too tempting. If the appetite be brisk, fish should form a large portion of the chief meal. All appetizers, as gin-and-bitters, are quite uncalled for; and the frequent draughts of alcohol in which some plethoric individuals indulge, are to be strictly forbidden, or very much limited.

Then it is desirable that exercise should be taken, so as to meet and neutralize the large amounts of food consumed. It is recorded of a north-country squire that he knew the value

of exercise well, and not a labourer on his farm worked half so hard for his bread as he did—in order to indulge in the pleasures of the table with impunity. Some years after the allotted span had been reached, the plan was working famously. Where exercise is not so taken—and with many it would be impossible—then abstinence and depletion must be its substitutes. The meals must be fewer, more sparing, and of poorer quality.

Then there must be established a system of depletion. At one time bleeding was much in vogue, and persons were bled periodically for plethora. But this is a radically bad plan. It is well known that losses of blood are often rapidly repaired, and the more often repeated the loss, the greater the assimilative power. When persons are bled at frequent intervals the blood-formation is rapid; a state of recurrent plethora is swiftly induced, and the distension of the blood-vessels arising therefrom, is a great source of danger, and especially of apoplexy. The same may be said of any other form of depletion, including intermittent purgation. The thing to be aimed at is a steady, continuous drain. This is often established by hæmorrhoids, and in some plethoric individuals the arrest of this loss from any cause is followed by general vascular fulness, injected countenance and dyspnœa; all of which disappear when the bleeding from the piles recommences. The same symptoms follow from the temporary arrests of other drains. Then the bowels must be acted on: and this action must not be restricted to keeping the bowels open, or even well open, it must amount to free purgation. For this purpose saline purgatives are chiefly indicated. If vegetable agents are used it must only be in connection with mineral salts, as in the well-known black draught. Purgation, when continued, forms an exhausting discharge; when artificially induced in plethora it forms an excellent remedial agent. The Hunyadi Janos bitter water is one of the best purgatives we possess for the relief of plethora. The dose can easily be regulated so as to merely open the bowels, or to cause active catharsis. Other waters possess similar properties. The advantage of purgation is that it can be continued steadily week after week, and month after month. It is this that qualifies it so well for the treatment of plethora. A brief

residence at a sulphur spring is a very good measure, but then it is too often temporary in character. It is instructive to see the number of stalwart and full-fed plethoric individuals who gather together at Harrogate, as soon as warm weather cuts down their power of getting rid of their food by oxidation. The bracing air, charged with oxygen, and the sulphur springs combined, give Harrogate a great advantage over most other health resorts, as the number of persons drinking the waters in the pump-room every morning, and then, after a walk, besieging the numerous cloacæ, abundantly testify. After such a course the pleasures of the table resume their wonted attractiveness. Without such a course, in many of these *habitués* life would soon be extinguished. Where this line of treatment is impossible, or the necessity for purgation is continuous and persistent, such natural waters can be purchased in bottles and drunk at home. If mineral salts be used, it is desirable that they should be diluted, in imitation of the natural waters. Waters charged with purgative alkalies are specially indicated where the tongue is foul, and there are other evidences of biliary turgescence. It is scarcely desirable to take mercurials constantly, and alkaline purgatives are the best for continuous use. Where there is a weak and dilated heart, such waters are indicated as contain both saline constituents and a certain amount of chalybeate matter. Very often a little chalybeate water goes well with sulphur water—not combined before drinking—and the union of these two at one spa is a great advantage. When a summer at Harrogate and a winter at Bath are out of the question, artificial substitutes for these spas are quite feasible. Salts of various kinds are attainable, and perhaps the best is furnished by sulphate of magnesium.

℞ Mag. Sulph. ℥ss.
Sod. Pot. Tart. ℈ ii.
Inf. Gent. ad ℥ii.

taken warm every morning, or second morning, will be found to relieve the portal circulation without destroying the appetite or disturbing the stomach. Often, however, the loss of appetite is the best thing that could happen—and this natural loss of

appetite in plethoric individuals is an instinctive action which should not be hastily interfered with.

Such is the line of treatment to be pursued in the case of plethoric individuals. But the discriminating medical man will soon learn to distinguish between those cases where depletion simply is indicated, as in sthenic plethora; and those cases of asthenic plethora, where the florid complexion and swollen capillaries are associated with a weak heart and a compressible pulse—where iron and tonics may be profitably combined with depletory measures. He will also bear in mind that the treatment must be persistent to meet an enduring condition.

§ 60. *Congestion.*—Congestion differs from inflammation, though it may be very commonly an early part of the inflammatory process. Congestion means dilatation of peripheral blood-vessels, whether external or internal. It is most commonly seen in the act of blushing; it has also been seen in the tails of newts after amputation from the body. It may be chiefly located in the arterioles, as in general plethora; or it may be situated in the venous radicles, as in the venous congestion resulting from impaired circulation, especially when due to tricuspid insufficiency. When congestion is long-continued various changes take place. If it be a serous membrane, there is usually effusion into the serous sac. If a viscus, there is usually a development of connective tissue; as is so frequent in the venous congestion, the backward-flow, or *rückwirkung*, of chronic valvular disease of the heart. Under these circumstances there is commonly albumin in the urine, as there is after ligature of the renal vein. Under all circumstances, long-continued congestion leads to tissue changes, and should be obviated as far as possible.

We have seen how much congestion of the viscera is associated with a condition of general plethora; and have seen how such congestion can best be met. Poor food and repeated depletion by various measures are the means by which it must be met under these circumstances. They had better be guarded and persistent than violent, and at intervals merely. When indicated, they had better be set on foot without delay. When there is uterine congestion, drachm doses of tincture of Senecio Jacobœa should be given three times a day in an ounce of

compound infusion of gentian. In this last-named affection we see one of the frequent causes of congestion, viz. irritation or sustained imperfect function. Where congestion of the uterus is due to ungratified sexual aspirations, to imperfect intercourse, or to substitutes for intercourse, its pathology is as follows:—There is that arterial fulness which is normal and physiological—if the condition be also normally relieved by orgasm, and secretion from the glands of Naboth synchronously with the secretion from the glands of Duvernay—that is, if there be natural intercourse. Under other circumstances the natural relief is not obtained, and the gorged vascular condition remains. This acts upon the cranial centres, through the numerous spinal fibrils in the nerves of the reproductive system, and the cerebral excitation maintains a dilated condition of the blood-vessels of the part. The consequence of this is that the uterus becomes enlarged, heavy, often hot, and subjectively a source of disturbance. It is the subject of congestion which is vascular truly, but which takes its origin in nerve-disturbance first. Such a condition, alike in the spinster and the wife, is kept up by ovarian mischief. Not only must measures for the relief of the circulation be adopted, but measures for lowering the nervous action must also be had recourse to. Not only ought the uterus to be unloaded by local abstraction of blood—and this should be accompanied by a general depletion of the portal circulation by purgatives—but certain neurotics, known to possess an effect upon the nervous system generally, and on the nervous supply of the reproductive organs in particular, must be exhibited. Bromide of potassium, hyoscyamus, and camphor are the agents in most repute for such purpose. The different measures may be profitably combined. But other addenda suggest themselves; such as the avoidance of any load in the lower bowels, any irritation in the rectum, any local irritation of whatever kind; or anything which might lead to local congestion from its effect upon the nervous centres first, whether intrinsic or extrinsic. All straining at stool, horseback exercise, which produces pelvic congestion, heavy clothes hanging from the waist and compressing the pelvic viscera, hot rooms, and soft and warm arm-chairs should also be avoided.

No remedial measures would be at all likely to be successful

if the patient lay in a warm room, on a soft couch, and read French novels; or if she worked steadily at a double-treadle sewing-machine.

The liver is especially liable to congestion, and here again the measures just enumerated for the relief of a loaded portal circulation may be profitably resorted to. But here it is desirable to avoid another set of conditions which would tend to keep up the congestion. First is the avoidance of alcohol; especially when in large quantities and undiluted. If this agent be taken, the excessive vascularity of the liver will be kept up in spite of free purgation. Another thing to be avoided is indulgence in highly-spiced and rich dishes. By such food a condition of biliary, as compared with true vascular, congestion, will be kept up. At the same time large hot poultices over the region of the liver will often induce these discharges of bile, which give such relief in congestion of the liver. The use of poultices over the liver is far from being as common as it ought to be.

The kidneys may be, and often are, congested, and when this is the case great relief will be afforded by free action on the intestinal canal; for such action not only forms a derivative, but the relief of the portal circulation has been found to ease the renal congestion. The skin must be freely acted upon by warm baths. Such action of the skin produces the same effect in depurating the blood as is achieved by the action of the kidneys; while it lowers the blood-pressure generally, by the dilatation of the cutaneous vessels. Mere local measures, such as wet or dry cupping over the loins, mustard, and blisters, or hot poultices dusted over with mustard, are also efficacious. These various lines of treatment may be combined in cases of acute congestion of the kidneys, which so commonly threatens the existence of man.

Congestion of the lungs is a common consequence of cold. It also arises from disease of the left side of the heart. Further, it is frequently seen in the course of severe attacks of fever, especially in asthenic systems. It becomes at once obvious that the treatment of pulmonary congestion must rest upon its causal associations. Where it arises from cold it is usually necessary to throw the skin into free action, and as the cutaneous

vessels dilate, the pressure is reduced in the pulmonic circulation, and relief is obtained. This plan succeeded admirably in a case of hæmoptysis recently under treatment. Where it is associated with cardiac mischief, it is desirable to enlarge the general vascular area by dilating the cutaneous blood-vessels of the trunk by a jacket poultice, thus taking off from the distension of the right ventricle; and also at the same time to stimulate the gorged right ventricle to contract upon its contents by administering digitalis, along with ammonia, spirits of chloroform, or alcohol. When, however, pulmonary congestion arises during the latter stages of an adynamic type of fever, it is what is usually termed hypostatic, *i. e.* the result of the action of gravity merely. When the patient lies upon his back, as he does in the typhoid condition, the posterior portions of the lungs are among the most dependent parts of the body. The blood collects in them, from lack of tone in the vessels to prevent such stagnation. It becomes at once apparent that under these circumstances stimulants must be administered, and freely too, in order to maintain the power of the circulation. But more than that, mere position is not without its importance. As long as the patient can turn over on either side, the lung of the other side is to some extent unloaded, and so relieved. Old practitioners are always hopeful of fever patients so long as they can turn over. The same species of hypostatic congestion is found under similar circumstances in the kidneys; and when the power to turn over is lost, it is a good practice to roll the patient first on to one side for an hour or two, and then on to the other, in order to mechanically unload the congested viscera of each side alternately, especially in advanced typhoid states. Such measures, combined with stimulants, are often successful in enabling many fever-stricken patients to recover from a condition which ever gravely imperils the existence of the organism.

At other times there exists a state of congestion of the lungs which commonly enough is the immediate precursor of tubercle. If this condition of vascular congestion persists, cell-growth, its sequel, will usually not be long deferred. Sometimes this congestion is relieved by local hæmorrhage, or hæmoptysis; and however alarming at the time, and to the subject of it, there is

no room for doubt but that at times hæmoptysis is one of the very best forms of local bleeding. It can, however, often be obviated by purgation, or by increasing the action of the skin; and these measures may often be advantageously aided by giving a fillip to the driving power of the heart. The hæmoptysis of early or quiescent lung-mischief is usually associated with constipation, and is relieved by purgatives. The lungs furnish distinct illustrations of the various forms of congestion, and of the different measures to be adopted in such case, according to its causation and associations.

Cerebral congestion illustrates well the association of local determinations of blood, otherwise known as congestions, with conditions either of anæmia or plethora. The feeling as if a bolt were driven through the forehead, together with vertigo, pulsation of the carotids, and a flow of distorted ideas, is characteristic of cerebral hyperæmia with plethora; as dull headache and a feeble pulse are indicative of asthenic hyperæmia; not uncommonly found along with states of general anæmia. The treatment of these allied yet dissimilar conditions, is widely different. In each form hæmorrhage from the Schneiderian membrane will often give relief: and so far as local measures are concerned, there is little difference betwixt sthenic and asthenic congestion. It is in the general treatment that the difference essentially lies. To treat asthenic congestion with a sharp cathartic, might possibly be successful, but it will be much more likely to be harmful; while in sthenic cerebral congestion, it would form an excellent measure, indeed the first to be adopted. Low diet, purgation, and the derivative action of mustard to the calves of the legs, or the foot-bath of hot-water and mustard are indicated in active hyperæmia. Even bleeding may not be altogether out of place. But in asthenic cerebral hyperæmia, stimulants and tonics, together with agents improving the circulation, are just as certainly required. The fulness may be arterial, and need depletion; or it may be venous, and need stimulation. According to its pathological relations will be its treatment, if the practitioner be thoughtful and wary.

§ 61. So closely is œdema associated with congestion that it is necessary to consider it here. It may be of varied origin;

but it is rarely allied with sthenic congestion. It may be occasioned, and often is, by venous fulness with pressure on the venous radicles. As such, it is often found in the lower limbs when the circulation is defective, either from cardiac failure; obstruction to the circulation through the lungs; or general debility, either in simple anæmia, or in conditions of advanced disease. It is found in either upper or lower limbs where there is pressure upon the venæ cavæ, or upon the main venous trunk of a limb. It is also found in renal disease. If chronic, it is partial, but more or less extensive; if acute, it is general, forming anasarca. It indicates a condition of blood in which there is hydræmia, or an excess of water. The measures best calculated to relieve it are those which improve the circulation, or aid in the elimination of water. Often these may be combined with advantage. When the circulation is at fault the treatment for cardiac dropsy must be adopted. Where the emunctories of water are acting imperfectly, the bowels and skin may be called into requisition as auxiliaries to the inadequate action of the kidneys. At times relief may be given by permitting the effused fluid to find its way out by prickings or incisions. If the œdema be cardiac, without renal complication, this last plan is less effective than when there is a renal factor in action.

CHAPTER VII

GROWTH AND DECAY

§ 62. As an apple grows, ripens, and then decays, so does the human organism. It has its three periods too: 1, the period of growth; 2, the maintenance of integrity; and 3, the period of decay. There are many matters connected with the first and third periods which call for special attention. The middle period has nothing about it, normally at least, calling for especial remark. But of the other periods it is different. During the period of growth there is not only the repair, but the growth of the tissues to be promoted. Consequently the appetite of the child is active, and its assimilative powers are not readily overtaxed. The tendency however of childhood, in its more special maladies, is towards failure, more or less complete in the nutritive processes. In this it presents a strong contrast to advanced life, where the chief difficulties lie in the inability of the system to dispose satisfactorily of its waste. The food of the child should be simple, should be satisfying, and should contain a fitting proportion of the material required for healthy tissue-building. In milk, combined with farinaceous matters, we find the most appropriate food for infancy; and the dietary of the nursery is a choice determined by long experience, of which, however, advancing knowledge thoroughly approves. A certain proportion of fat is also essential. At present there is a decided objection on the part of children to eat fat; some of this is doubtless in many cases due to an inability to digest fat in its ordinary forms, and consequently the more easily digestible fats, butter and cod-liver oil, must be resorted to. But in other cases the objection has no such valid foundation,

and is rather due to fashion or caprice. The importance of a sufficiency of fat in the dietary of children cannot be over-estimated. In New Zealand children—Anglo-Saxon—are commonly seen with a piece of fat in their hands, slowly eating it. There are good prospects in the future for a race where this is common. With a suitable dietary children do not need, or very seldom, that drugging which seems to some parents indispensable. It is too much the fashion to administer medicines of various kinds to children, most of which are quite uncalled for. The chief medicines required by children are those that act upon the intestinal canal, which is apt to be disordered from its functional activity. But even here it is often well to let the child alone; the loss of appetite is a natural outcome of repletion, and the malady carries with it its own cure. A greater portion of the ailments of children are natural actions rather than diseases *per se*, and those children who are left most alone usually do best.

There are, however, many troubles which are inseparable from this period: some are unavoidable; others again are more or less due to causes which admit of being met, or even of being avoided altogether. Among these latter are the different disturbing causes which act mediately upon the child through the system of the mother. Such are mental disturbances. After a great fright a mother has been known to suckle her child, and forthwith the child has died. What the change was which made the mother's milk a poison to her child we do not know. Lesser effects are much more commonly induced, and a fit of passion in the mother often so modifies her milk that it purges her infant. Such are some of the risks run by the baby which are capable of being averted by thoughtfulness and care. In *Levana; or, the Doctrine of Education*, Jean Paul Richter says:—"One scream of fear from a mother may resound through the whole life of her daughter; for no rational discourse can extinguish the mother's scream. You may make any full-stop, colon, semicolon, or comma of life before your children, but not a note of exclamation!" There are however numerous other causes of disturbance which cannot so easily be averted. Among these are the common disturbances of babyhood, which arise from passing periods of acidity to which the digestive

system of the infant is liable. It often "possets" its milk, which in curdled lumps is vomited, or ejected by purgation. In which case it is well to get rid of the indigestible mass; and the ejective process should not be rashly interfered with. To obviate such curdling an alkali must be added to the milk, and of such agents the best is lime-water. This not only neutralizes the excess of acid, but it also furnishes lime to a system in need of it. Alkaline carbonates are apt to cause disturbance from the disengaged gas given off in the stomach. This renders them unsuited for permanent use. As an occasional resort they are unobjectionable enough; and the following forms a capital mixture for children who are griped after their milk:—

Pot. Bicarb. gr. ii.
Ol. Cajeput, ♏i.
Aq. Anethi, ℥ii.

three or four times a day. This usually gives relief, and speedily too. It may be advantageously preceded by a dose of castor-oil. At other times children seem to suffer severely from the act of digestion; it does not appear to them a painless process, but one which produces suffering. In such cases bromide of potassium is indicated:—

Pot. Brom. gr. vii.
Aq. Anethi, ℥ii. ter in die,

will often give great and decided relief. In the troubles of teething some such medicament is indicated in order to deaden the painful sensations which accompany and arise out of the emerging of the tooth from the gum. This irritation often causes a febrile condition, especially if the saliva secreted so freely by the reflex consequences of the irritation in the gum, is wasted on the bib. It is a matter of observation that the child which wets its bib much, is that which suffers most in teething. Vogel says that the saliva is purgative, and that the purgation lowers the fever temperature, and so does the infant good. If this be so, it will not be wise to check purgation under these circumstances, unless it be excessive. When, however, it is necessary to check diarrhœa in children, the measure selected must be in accordance with the indications. If the

secretions are acid and sour to the smell, and are accompanied by griping, then magnesia may be administered. If the diarrhœa is profuse and persistent, decoction of logwood is the best of all agents to select. Its taste is not unpleasant, its use is not accompanied by danger; and its chief drawback, its staining properties, is easily met by putting an old cloth of any kind under the chin when it is being administered. It is an advantage to combine it with chalk. Sometimes it may be necessary to cut the gums, especially if convulsions are threatening. If the tooth is just emerging there may be no objection to this. But if the gum is swollen and congested over a tooth not yet at, or near, the surface, such cutting is undesirable; the cicatrix resulting forms an obstacle to the tooth in the future; an obstacle not rarely sufficient to throw the tooth out of the straight line of growth. Probably a slight purgative given to the child, or to its nurse if still suckling, will relieve the congestion as well, or better, than the gum-lancet. We now know that every little divergence from ideal health does not call for immediate active interference.

When it becomes desirable to add some other food to the baby's milk a varied choice is offered. The various foods containing predigested carbohydrates have the advantage of offering a change. It is not well to adhere rigidly to one form. In addition to the hydrocarbons, a certain amount of nitrogen and a certain proportion of various salts are requisite. Flour, however prepared, is an improper food with water alone; a little meat-juice is better; but milk is the proper accompaniment. Milk should form a great portion of the dietary till the full growth is reached. Oatmeal-porridge and milk is the best of all combinations for growing children; though of course it is not absolutely necessary to adhere to this exclusively. In the abandonment of such farinaceous food, and in the now prevalent dislike to fat, do we find the explanation of much of our modern disease. Imperfect evolution, degraded or arrested tissue-growth, and numerous others of the troubles belonging to the period of evolution, take their origin in an erroneous and mischievous dietary. We now know distinctly that hydrocarbons play an important part in cell-formation and in tissue-building. They are not less necessary for perfect histo-

genesis than they are requisite for the maintenance of the body-heat and the manifestation of energy.

The aversion to fat, which is often the precursor of consumption—which leads to imperfect tissue formation and thus to tubercle—is very often a foolish caprice and an ignorant prejudice; though doubtless at times it may arise independently of the will. If the inability to eat fat were successfully opposed, many of those dangers of imperfect cell-growth might be avoided, which afterwards cause so much consternation, and subsequent contrition. When tubercle has once established itself, then there is resort to cod-liver oil—which after all is nothing more than the most digestible of fats—to medicine, a fixed dietary; and to numerous means which would have been much more effectual if adopted as a preventive, rather than as remedial and restorative measures. Those very measures we adopt to restore tissue-growth to its pristine integrity are those which should have been used all along.

§ 63. The food of the child should be simple, and not such as to unduly incite the appetite. If a child is well it will usually eat sufficiently freely without any special temptation. In consequence of the demands of growth the digestive system is much exercised, and is a common source of trouble. There are passing fits of constipation, needing a gentle laxative, as manna, a fig, or a prune. There are periods of diarrhœa which may be treated as directed in the last section; but there is another form of diarrhœa than those given there which calls for its own special treatment. Here there is a certain amount of irritating material in the bowels, and the diarrhœa is an abortive attempt to get rid of the offending material. The fluid poured out by the natural effort is often below the seat of the offending matter, and so fails to remove it. A purgative excites action above as well, and the irritant mass is then swept away. In such cases castor-oil is the best of remedies. It may be given in the following formula:—

Ol. Ricini, ℥ss.
Mist. Acaciæ, ℥iii.
Ol. Menthæ, ♏iii.
Aquæ Distil. ℥v.

This might be given in two doses at an interval of four hours. At other times children are liable to accumulations of bile, which generally pass away in "a sick fit." There is vomiting, soon bringing up bile, and then spontaneous purgation follows, which should not be rashly interfered with. Sometimes there is a sharp rise of temperature at the commencement of these attacks, as they are termed. In addition to these troubles children are apt to have attacks of acute indigestion, in which the temperature quickly rises to 105° Fahr. The very sharp rise, and its height, will generally distinguish these attacks from a commencing exanthem. An emetic, as Pulv. Ipecac. gr. v., Calomel gr. iii., will often be found useful: after the vomiting spontaneous catharsis may come on; if it does not, a few grains of jalap or scammony, or a little senna may be given. It must be understood that in speaking of children here the term is meant to include the period of the second dentition, up to about ten or twelve. The dose mentioned here is adapted to an age of six or seven. If younger the dose must be lessened; if older a little more must be given.

In addition to the various ailments given above, and which are more or less found in every child, no matter how healthy, there is a form of fever known as infantile remittent fever (of old "worm fever") to which children are prone. In the morning, in slight cases, they are almost well, in the evening they are feverish. In more marked cases there may be one or two remissions each day. The old-fashioned plan of treating such pyretic conditions by acetate of ammonium, is far from satisfactory; quinine with a mineral acid gives much more beneficial results:—

Quin. Sulph. gr. ½.
Ac. Hydrochlor. Dil. ℥iii.
Syr. Aurantii, ℥xx.
Aq. ad ℥ii.

This mixture three or four times a day will produce good effects. In some children rapid growth produces febrile conditions with much *malaise;* but without the marked remission which characterizes the last form of fever. Here mineral acids seem to give relief.

§ 64. The most marked characteristic of the acute diseases of children is the quickness with which they usually come and go. If, however, the child is feeble or weakly, acute disease commonly lays the foundation of a chronic ailment. In children where such mischief may be apprehended, the greatest care should be taken to see that the convalescence be not checked or interrupted. Fresh air, good milk, a little tonic, and then iron and cod-liver oil, must form the routine treatment of convalescence in such children.

There are some points of much importance about disease in children which may be alluded to here. The first is this. Children can often endure much, but if they get bronchitis it is very apt to be fatal. Bronchitis, which very rarely kills the healthy adult, is a very grave matter at the extremes of life. It is commonly fatal in weakly children, and it often severely tests the powers of strong children. In no ailment, which we are called upon to treat, is it so necessary for the practitioner to recognize the dangers ahead, and to learn to meet them. Milk, beef-tea, and wine have often to be given freely before there seems much need of them. If their administration is delayed till the hour of need arrives, it will be found to be too late for them to be of use. Very commonly the mother will be found to protest against such measures, as calculated to increase the fever, so she says; but she must be instructed to follow out the orders, and the result will usually confirm the view taken. In tea-fed children bronchitis is most fatal; and a whole family is sometimes swept away, one by one, by this malady.

Children are liable to acute colds and passing inflammations in consequence of their tendency to lose heat readily on the one hand; and their ignorance of how to guard against such loss on the other. Fashion, too, leaves the child often unprotected against the blast to which it is exposed; and acts in utter defiance of the physiological fact that children lose heat rapidly. Here the very helplessness of the child is abused by those who ought to be its guardians and protectors. The plan of systematically "hardening" children is professedly abandoned; but it nevertheless obtains yet. It is certainly undesirable that children should be made artificially delicate and susceptible by the "coddling" plan; but the combination of this latter

plan with insufficient clothing when out of doors, is very dangerous.

§ 65. The chronic affections of children are often very serious, and are always very troublesome. One of the greatest evils which besets early life is the tendency to form tubercle. This form of perverted growth will be discussed further on, but a few words now are not out of place. This degraded form of cell-life is very common in childhood, and is chiefly found in the bowels and in the brain. In the latter it gives rise to hydrocephalus (tubercular meningitis). As such it is very swiftly fatal. As however tubercular meningitis (hydrocephalus) is not always to be distinguished from simple meningitis, it is as well to treat each case as possibly tubercular, and the best remedial combination is that of iodide and bromide of potassium in full doses several times a day. Counter-irritation to the head has its advocates. When the tubercle is in the bowels and peritoneum, the disease is lingering and troublesome. Astringent mixtures, milk, iron, iodide of iron, &c., are all indicated from time to time, according to the varying phases of the case.

At other times there is softening of the osseous system known as rickets. This may extend from mere curvature of the spine, especially if the child be borne almost exclusively in one arm of the mother, up to the advanced condition vividly pictured by Sir William Jenner:—"It is strange to see a little child sitting placidly on the bed, without moving, for hours together,—its legs placed so as to escape pressure, its spine bowed, its head thrown backward, the chief weight of its body cast on its arms; and to know that, notwithstanding the apparent calm, the tiny thing is indeed fighting the battle of life; for it is striving, with all the energy it has, to keep in constant action every one of its muscles of inspiration—endeavouring so to supply the mechanical defects of its respiratory apparatus, due to the softening of the ribs. It wants no toys. It is the best of children if you only leave it alone; move it, and you inflict pain on its tender frame; show it the horse or the doll that was once its delight, and it turns away its head, or stares vacantly; to notice would divert its attention too much from the performance of those respiratory movements

which are essential to its existence." In its most aggravated form rickets is an intractable affection; but in the less marked cases much may be done by phosphate of lime (10 grains ter in die) or syrup of phosphate of iron and lime ℥ss., together with milk, fresh air, and salt-water spongings.

Marasmus, or simple wasting from mal-nutrition, is a common affection, and the wasted, old, and even wizened faces of the unfortunate babies have a weird look about them. There is often too an unnatural calm about them which is very appalling. They rarely benefit much by medicines given by the mouth, but they often improve surprisingly by inunctions of olive or neat's-foot oil. The child should be stripped before the fire, and a tablespoonful, or two, of oil should be well rubbed into its skin with the hand. This should be done twice a day. After the child has begun to improve, the syrup of phosphate of iron and cod-liver oil may be administered with advantage. Wasting with green stools is often the result of too prolonged suckling. The child should be weaned, and iron and cod-liver oil given as above; when it usually rapidly improves. Sometimes children sweat profusely, to an exhausting extent even; here sulphate of atropine (gr. $\frac{1}{100}$) three times a day in dill-water is useful. Children bear belladonna well. In incontinence of urine the above dose of belladonna is usually efficacious. But if there exist local causes of irritation all schemes of treatment are useless until these be removed. Ascarides call for santonin.

At other times syphilis interferes with healthy evolution, and manifests itself in numerous and widely different forms. In skin eruptions, ulcerations, deformity of the nasal bones or of the forehead, in internal diseases, in anæmia, or arrested evolution, the inherited taint manifests its baneful influence. It is common to treat such cases with iodide of potassium, but many prefer a course of mercury combined with iron, as follows:—

Liq. Hyd. Perchlor. ♏xv.
Tinct. Fer. Perclor. ♏iii.
Aquæ ℥ii. ter in die.

Given after meals, this combination secures all the good effects

of mercury, and yet obviates its evil effects upon the system. The iron and good nutritious food counteract the lowering and destructive action of the mercury, while it engages the syphilis and destroys the taint—whatever it may be.

Of all the diathetic affections of childhood perhaps struma is the worst misfortune. As scrofula, or king's evil, it was supposed to require the royal touch, and great was the discussion as to whether William the Third possessed the power to heal it or not. But now we have abandoned all such figments, and have set to work, under the combined lights of pathology and experience, to combat the perverted nutrition which we recognize as the visible sign of the strumous diathesis. Our fairest child—the little piquant precocious fairy, whose pretty imperiousness compels all to yield to her caprices, with open eyes and long eyelashes, the family pet—is usually not a perfectly healthy organism; any more than is the bright creature whose neck becomes furrowed with the cicatrices of scrofulous ulceration. The intelligent, active boy who comes home one day from school with a limp, complaining of his knee, and who after long suffering we find at the seaside crippled for life with hip-joint disease, is another illustration of strumous taint. The full-lipped pink and white countenance, with a certain fulness of the alæ of the nose, often so attractive, especially when combined with high intelligence, is also a modification of struma. So also are the marked features, earthy complexion, and dense, straight or highly-arched black eyebrows, which often give such character to a face. When black-haired or red-haired persons once develop tubercle they usually go very rapidly; much faster than the brown-haired, or even than blondes.

In early childhood this taint frequently shows itself in thickening of the epiphyses and fulness of the joints. Often this thickening is regarded as evidence of wonderful physical power in the future, and the child is said to be "double-jointed"; but this is an utter mistake. A little later the taint shows itself in precocity, and the child is a prodigy of cleverness and learning. This may be; but it is only, after all, another evidence of struma. It may grow very beautiful, and from love of praise very good—"too good for this world." At puberty, in those that survive, there is often rapid growth, which commonly terminates

in consumption. When adolescence merges into adult life the character of the precocity remains; but, though quick, the person is too often superficial. These persons are generally anxious to become parents; but they are not quite justified in their self-elected task. Their families are often large, but individually their offspring are weak and delicate. Such persons form a large portion of mediocrity and of society; but they are far from ideal types of physical development.

This brief sketch will perhaps aid the reader to detect the strumous diathesis in its finer shades. It is easily diagnosed in its grosser manifestations. When diagnosed it requires a distinct line of treatment. First of all the secretions and excretions must be attended to. The bowels are apt to be sluggish or irregular, the liver does not always do its work, but suffers from passing derangements: both of these must be attended to and regulated—but the less mercury used the better. There is also a constant tendency to acidity, which requires lime-water, seltzer, or Vichy; the first is best adapted to infants, the latter for growing children. The perspiration is often acid, and the urine contains quantities of lithates, or even uric acid. The men of past generations, Brandish and Lugol, found potash the best remedy for the relief of strumous affections. They observed that it possessed no truly curative action; but it gave relief. The effect of fresh air upon strumous children is well known. Doubtless it favours the combustion of the imperfectly oxidized products with which the system is laden. But in fresh air and potash or lime we find only aids to improvement, the excessive formation of acid finds its causation in faulty assimilation. Broadbent says, "When we examine the excretions for the products of combustion, and thence draw conclusions as to the completeness of the process, it must be remembered that the more or less perfect oxidation may depend upon the more or less perfect antecedent nutrition, and not merely on the supply of oxygen, or any immediate influence on destructive metamorphosis. Thus, the uric acid which forms the urinary excretion of birds whose habits are active and temperature high, and whose blood is highly oxygenated, cannot arise from insufficient supply of oxygen, but must depend upon some peculiarity in their tissues; so also in man, uric acid may

be the effect of defective nutrition or primary assimilation, and not merely of imperfect metamorphosis or oxidation. The clinical history of the so-called uric acid diathesis supports this view, and shows that the remedy in many cases must be sought, not in the promotion of the oxidation, but in modification of the nutritive processes." From this view it is impossible to dissent, and in the pathology of the ailment we find a direction given to our treatment. The alkalies we administer may be given with advantage in vegetable bitters, or aromatic bitters. To these may be added at times some potassio-tartrate of iron. When the assimilation of food is imperfect and ordinary fats are refused, cod-liver oil may be given; and if that disagrees, or if the patients think it too commonplace, cream may be given; and for the latter class cream and maraschino form a capital combination. The bowels also should be attended to, and the skin kept in action by baths, with or without sea-salt. Such persons should be much in the open air. Their holidays should be spent at the sea-side in some far-away, but bracing nook. Their school-rooms should be airy and well-ventilated. Their hours of study should not be long. In fact they should be discouraged from study, and any temporary lagging behind will usually be readily made up; after the physique has been improved, and thus the brain better sustained by an invigorated nutrition, the progress will be more rapid and yet more thorough. In persons of this diathesis an active brain is often let down by its association with a defective and easily exhausted physique.

So much for the general indications as to the requirements and necessities of growth. The different pyretic affections to which youth is liable, and especially the exanthems, will be given in a subsequent chapter.

DECAY.

§ 66. After the attainment of maturity the organism maintains itself for many years in its integrity without much alteration, unless it be some increase in weight. But in time there commences a series of changes known as senile decay. Such changes are easily recognized in the very old, whether

old in years or physiologically old; but they are commonly overlooked until their existence is almost forced upon the attention of the observer. This is unfortunate, as it is often a matter of great moment, in the recognition of the true state of a case, to be able to detect the early evidences of impending decay. The process is normally a slow one, and consequently the first changes must be insidious and occult. Not only that, but they will usually be very slowly developed. This, however, forms no reason why these changes should be overlooked, and thus their significance be omitted from our estimate. Many people, too, even medical men, have irrational notions about their health and their tissues. The idea that there may be commencing atheroma in their blood-vessels; that there is a commencing hypertrophy of the heart; or that their kidneys are no longer in their integrity; is sufficient not only to perturb them, but to set them to work at once to prove, at least to their own satisfaction, that they are free from anything of the kind. They quickly persuade themselves that their tissues are perfectly healthy, and that they are free from the slightest taint of commencing decay. If it were merely a subject of self-satisfaction to the individual it would matter little; but unfortunately such attitude and conduct stand in the very way of a proper comprehension of the slow and gradual progress of some chronic changes. These prejudices foster ignorance; and that ignorance often assumes an aggressive character.

Long before they obtrude themselves upon the vision of the unwilling observer, there are instituted changes which mark the oncome of age. The hair commences to frost, or to fall off, and loses its lustre. The skin becomes dry, and no longer glistens with the glow normal to youth. The frame loses its elasticity and the step is no longer springy. The gait is stiff; the motions are slower. The mind is not so quick in its operations, and no longer learns so readily; it has lost much of its apprehensiveness. Names, words, dates, and other matters which do not lie in the direct path of associations, are elusive and not readily recalled. The residua are still in the cerebral cells; but they are not so readily communicated with as of yore. The thought is not so nimble, though it is more deliberative and accurate in its processes,—at least in the early stages. The secretions are

less active, and a foul odour of the breath often tells that excretion is no longer so perfect as it used to be. There is also a tendency to rheums from the different mucous surfaces. The bowels are sluggish, and there is a marked inclination to accumulate fæces in the intestinal canal, together with torpor in the muscular fibre of the gut. The flow of urine is often increased—except where there is disease of the heart; but the urine is either of low specific gravity, or, at other times, laden with lithates, indicating imperfect oxidation. There are, too, troubles in connection with the making of water. There is an increased susceptibility to the natural calls, while these latter cause greater urgency, so that it is no longer possible to evade complying with them. This vesical irritability is a great source of annoyance to elderly people, and harasses them at public gatherings, and when travelling. It is commonly associated with enlargement of the middle lobe of the prostate gland. This forms an obstruction to the complete emptying of the bladder; never empty, it soon fills to the point of creating a call to void its contents. And that call must be attended to at once, it cannot be restrained! At other times there is irritability in the vesical centres, which is often very much relieved by belladonna. It is commonly increased by strychnine or quinine. The circulation is no longer so perfect, and effort produces dyspnœa, or shortness of breath, on slight exertion. The costal cartilages ossify, and the movements of the thorax are impaired. There is a tendency to emphysema from the violent efforts made at times, especially if there be a certain amount of chronic thickening about the bronchial tubes. There is frequently a great tendency towards an abnormally profuse secretion from the air-tubes, not always of an inflammatory, but sometimes of a degenerative character. It is not bronchitis, but one of the rheums of age. There is also a flow from the lining membranes of the nasal cavities.

The whole of the tissues are modified, and so is their functional activity. The hand is tremulous, and highly co-ordinated movements are being gradually impaired, so that the hand and fingers fumble where they used to act almost unconsciously. The application of the attention is requisite for movements which were once almost intuitive. A long and tedious process

is required to recall what at one time almost leapt upon the consciousness, so quick the act of memory. A careful inspection of a microscopic section of an aged brain shows that the spur-like processes of the cerebral cells, which once formed a sort of interlacement, are worn through, and the cerebral cell is rounded and club-shaped—its residua remain to each cell, but the communicating lines no longer exist; and so the residua can no longer be communicated with—in other words, the memory fails, and then ultimately is lost. The muscles lose their plumpness, become lax and lose their power. The viscera are sluggish and inactive, and lesser matters serve to disturb them than has hitherto been the case. There is a lessened power to withstand disturbing influences; the loss of heat is more easily induced, and the intolerance of a low temperature is pronounced. In this last the old person once more resembles the child. There is a gradual tendency to sleep more and more; and the short hours of sleep which characterize middle age merge insensibly into longer and longer hours, till the hours of sleep once more exceed the waking. The petulance of childhood is again approached, and elderly persons brook control little better than a child. The appetite is impaired, and is often capricious. The power to digest large quantities of animal food varies, and in place of underdone meat well-cooked animal food is preferred. At last meat is little craved after, and milk-puddings, bread-and-butter, and the non-nitrogenized diet of early days are again the staple food. The waning brain-power no longer desires the stimulating nitrogen to spur its lagging action. The prattling child becomes once more the most highly appreciated companion; and garrulous age loves to pour into uncritical youthful ears long tales of a far by-past time. In habits, thoughts, taste, food, in the obsolescence of the sexual passion, age approaches youth. The process of evolution has given place to a reversed action, or involution. The higher processes, which are slowly developed and are to a large extent outcomes of training and education, gradually fade out, and lose their controlling power,—the last to develop and the first to go; and the most vivid and enduring impressions of the doting brain are the experience of its early days, the impressions of childhood.

§ 67. This brief sketch of the changes of age will enable the reader to comprehend, more clearly, the indications for treatment in the ailments of advanced life. It is obvious that the aged frame is unequal to anything approaching heroic treatment. The defects in functional activity require to be met by a steady and persistent medication, rather than some sudden active effect upon the sluggish organs. It is no longer desirable to purge actively, except in emergencies; but the bowels must be regulated so as to keep them acting from day to day. Warm aloetic purgations, or confection of senna, are the laxatives best suited to the aged. If salines are taken it must be in combination with such vegetable allies and carminatives. In this respect old persons resemble women at the menopause, where carminatives must always be given freely with purgatives. All straining at stool is to be deprecated, as putting stress upon organs no longer fitted to bear it with impunity. The blood-vessels are more or less rigid tubes, and any strain upon them is apt to produce rupture. The structures of the heart are no longer in their pristine integrity, and are undermined by fatty degeneration or molecular necrosis; consequently they are unequal to effort, and straining at stool is not rarely followed by cessation of the heart's action. There is induced either rupture of an atheromatous artery from the heart being comparatively too strong; or the structurally decayed heart stops in an imperfect attempt to overcome the resistance offered to its contraction —unequal to forcing its contents into the altered arterial system. Many salines are too depressant to the heart to be given alone, and if it be desirable to administer potash it should be given with squill, digitalis, or belladonna. The stomach is unequal to the work of digesting a large meal, so that food should be given in small quantities and not at long intervals. It should be so prepared that it will require little or no mastication. The taste for highly-spiced foods is gradually diminished, and the food may be plain in character, as well as simple and easily digestible, with advantage. As to drinks—tea, coffee, and cocoa are all suitable; but alcohol in some form is usually the best fluid. It furnishes a readily available food, it is an easily oxidized carbo-hydrate. It is stimulating and refreshing. It gives a fillip to the digestive organs, and, by

increasing the vascularity of the stomach, aids it in its solvent and digestive action. It prevents the spasms, or colic to which elderly people are very liable. It feeds the starving brain, and once more gives it sensations of well-being, and enables it to work pleasantly. All this too is accompanied by little fear of its becoming a tyrant, or of its use being converted into an abuse. "Wine is the milk of the aged," is a Rhineland proverb; and there is much truth in the statement. Its stimulant effect is less seen in the aged, while its qualities as a food become more prominent. It forms an excellent hypnotic; and some alcohol and hot water, with some sugar, forms a famous "nightcap" for elderly persons when getting into bed. They are apt to be chilled from the slowness of their movements in undressing; and when they get into a cold bed the vessels of the skin are chilled and contract, and, not readily dilating again, the sleep is broken, imperfect, and unrefreshing. The bed should be aired, the room should be warmed by a fire lighted some hours previously, and the loss of heat should be met by a draught of warm fluid, containing alcohol, &c., on getting into bed. The alcohol is quickly burnt, giving heat; it dilates the vessels, and produces sleep of a refreshing character. It is obvious that the loss of heat by the dilated cutaneous vessels must be met by good bed-clothes, else the alcohol may do more harm than good. At other times old persons prefer beef-tea or meat-extract. This is a splendid stimulant, but it is inferior to alcohol as a food; and should be combined with some force-bearing food, as starch, in the form of sago, arrowroot, corn-flour, or biscuit-powder. In the case of the aged teetotaller a cupful of beef-essence, hot, and if necessary spiced, could be administered on getting into bed, if the sleep be broken and fitful. Or a cupful of hot milk might be given. It is as well always to respect the prejudices and convictions of patients; and many people have their opinions upon alcohol with which it is not well to war.

It has been said before that elderly persons easily lose heat. Their clothes should be warm, comfortable, and unirritating. With old people comfort usually takes preference of appearance: though such is not invariably the case. There should always be flannel worn next the skin, from the neck to the

wrists and ankles. These flannels should not be worn too many days consecutively, as the cutaneous excretion of aged persons is apt to become offensive. The clothes of the old should always be well-aired ere being put on. Their shoes, too, should be lined with fur or flannel. Their rooms should be comfortably warm; and they should not be permitted to catch cold in draughty, cold water-closets, or other conveniences. In such exposure, or in conducting their devotions in a state of partial nudity in cold bedrooms, do we find the origin of much of the illness of elderly people. Age is tenacious of habit; and in some cases the old are more easily managed if induced to adopt changes by some cajolement rather than by direct opposition. It is not possible to override the caprices of the aged, as can be done in case of the fancies of children. Their age entitles them to respectful treatment. Their waning power, however, calls for our attention; which must be well directed and cautiously exhibited. There is no part of medicine, as an art, which better tests the natural powers, and the educational cultivation of a medical man than his capacity to successfully meet the requirements of elderly patients. In each and every patient the skilful and enthusiastic practitioner will find a problem well worth his while to unravel and to thoroughly comprehend; and this is especially true of disease in advanced life, where every case will be found to have its own peculiarities, and to possess its own individual indications and necessities.

§ 68. As well as the clinical indications furnished to us by the extremes of life, there are other matters, connected with growth and decay, which deserve our attention. The consideration of them will enlighten us as to peculiarities in each case which are well worthy of our thought: and intelligent attention to these peculiarities will strengthen our hands as practitioners.

In youth we find that growth is active. The vascular system furnishes free supplies of pabulum, and the power of self-enlargement of each tissue is decided. When developed by exercise, or the demands of growth are active, each part attracts to it blood in free quantity. By what peculiar power the tissues do this we do not yet exactly know. So far as our knowledge extends, something like the following is shadowed

out. There is not only a vascular supply to each part of the body, but there is also a nervous supply. This nervous supply is something more than the mere afferent and efferent nerves known as motor and sentient nerves. It consists of nerve fibres which are connected with tissue nutrition. These fibres are not the vaso-motor of blood-vessels which contract the vessel, and whose section is followed by dilatation of the distal vessels; as Claude Bernard found to follow section of the sympathetic in the neck. They are antagonistic in action to the vaso-motor nerves, so they are termed vaso-inhibitory, or otherwise trophic nerves. When Hutchinson's well-known case of ulceration of the little finger, from a cut involving the ulnar nerve but not the ulnar artery, was published, it gave rise to much thought. There is every reason to believe that that ulceration took its origin in lack of nerve supply, and not in any defect in the blood-vessels. But how did this lack of nutrition come about? Schiff, Claude Bernard, Ludwig, Goltz, and others have indicated that there are nerve fibrils, belonging to blood-vessels, which are cerebro-spinal in all probability, and which produce active dilatation of vessels. When then the ulnar nerve was cut these fibrils were severed, and so the vaso-motor nerves, no longer held in check, contracted the blood-vessels, and then followed loss of temperature and molecular death. In Mr. Hilton's case where a mass pressing on a nerve produced peripheral ulceration, bandaging the hand, so that the mass no longer pressed upon the nerve, led to the healing process being inaugurated. It is difficult to conceive how this could be if there were not trophic fibres in nerve trunks. Disorganization of the cornea follows section of the fifth nerve if the least exciting cause of disturbance is in action. Disorganization of the lungs follows section of both vagi, but not of one. If a rabbit's head be cut off and the secreting fibres of the seventh pair irritated, the parotid will secrete fluid freely; and yet there is no possible increase of vascularity here, the secretion of course being limited to the fluid in store in the lymph-spaces of the glandular apparatus. We are only just beginning to see that nutrition is associated with something more than mere vascular supply; but it is not yet possible to be more precise. The trophic nerves are in all probability efferent nerves to the parts

with which they are associated. Irritation of them produces increased vascularity of the areas with which the nerves are connected, and a diminution of calibre of the rest of the blood-vessels of the body. This latter increases the general blood-pressure, and sends the blood with greater force into the hyper-vascular area. The synthesis we may construct is possibly this. The relations of tissues to their trophic nerves are such that when much exercised, or when growing rapidly, the trophic or vaso-inhibitory nerves are put in action; and thus growth is rendered possible by a freer blood-supply. That such trophic fibrils are usually part of motor nerves suggests that as the activity is great in the motor nerves going to the part, so is the activity of the trophic fibrils of that motor nerve; and thus increased nutrition goes to functionally active muscular fibre. Thus we have the hypertrophy of the arm of the smith and the leg of the dancer. In the same way paralyzed parts waste. There is no motor activity leading to nutrition: and the palsied tissue wastes. It may even disappear, as in the essential paralysis of childhood. In this last instance the application of electricity to the palsied muscles, and so the exciting of action, is followed by nutrition and the maintenance of structural integrity in the paralyzed muscles. Muscles waste in a limb after fracture. Here the nerve currents are not broken, only the muscles are kept passive, and so the relations existing normally betwixt acting muscle and its trophic nerves are disturbed. After the full stature of the individual is reached, nutrition still goes on, and the frame becomes well "set," broad, muscular, and fully developed.

This condition is maintained for some years; and then it yields to a gradual deterioration known as senile decay.

§ 69. The most familiar of all forms of textural decay is that known as "fatty degeneration." It is sometimes regarded as a species of atrophy: it is certainly a form of histolysis. Chemically it is allied to the formation of adipocere. It is sometimes a normal action. It is a part of the process of involution undergone by the uterus after parturition. It is found in paralyzed limbs. It is equally common in the quiescent muscles of a limb whose bone has been fractured. Erroneous impressions have existed about it. It has been confounded with fatty infiltra-

tion into the connective tissue betwixt muscular fibrillæ, and been supposed to have something to do with general obesity. Nothing could be farther from the mark. Extreme leanness confers no more immunity from fatty degeneration, than does obesity incline to it. It has nothing whatever to do with corpulence. It is a form of structural decay which, according to Rindfleisch, commences in the germinal matter of muscular fibre, and then extends throughout the formed material. It consists of the fat of the dissolved albuminous tissues. If this were removed by oxidation, and new pabulum freely furnished, possibly the muscular fibres would recover their pristine condition; in the same way that they recover from the degeneration found in them after sustained pyrexia. In fatty degeneration of the heart, that form due to "failing hypertrophy" must be distinguished from that due to "climacteric decay," or senile change. Certain it is, this degeneration is recovered from in the muscles of a fractured limb, and also in those associated with a paralyzed part. Hammond says that the degeneration is progressive in the palsied muscles of organic infantile paralysis, and gives drawings of the gradual structural decay. He also gives the improvement in the condition of the structures in a case where recovery took place. In ordinary cases, where no cure is achieved, the muscle becomes ultimately a piece of connective tissue, after the oil globules of the decayed muscular fibres are absorbed.

There is little to be learnt therapeutically from the pathology of fatty degeneration, or tissue-necrosis, except the negative lesson of the futility of attempting to arrest it by mere nutrition in the form of food; and especially in an abstinence from fat. The idea that cutting off the fat would arrest fatty degeneration was founded on the old notions as to its pathology. It may possibly be useful in checking the amount of fat in the blood, and so leaving the oxygen free to prey upon the degenerate tissues. But even for this removal of the old effete matter to achieve any good in the end, the capacity for improved nutrition must still remain. Where a limb is paralyzed, galvanism or electricity may keep the muscular structure in its integrity, or something near it; and a similar plan is useful in infantile paralysis. But of the means of arresting fatty degeneration,

especially in the terrible form of fatty degeneration of the walls of the heart in "failing hypertrophy," we know nothing. How it comes, and what are its causal relations and its pathological associations, will be discussed in the chapter which relates to the vascular system.

At the same time we must admit that it seems possible that in certain cases something may be done for fatty degeneration. These cases are of this kind. After a long debauch, where the blood has been constantly saturated with the readily oxidizable alcohol, and the respired oxygen has been engaged with the alcohol, a certain amount of fatty necrosis of muscular fibre may remain, and prevent the growth of new tissue. The persistence of urea in the urine would indicate the splitting up of albuminous bodies, the hydro-carbonaceous portions either remaining as fat or being burnt off. But it would be very difficult to detect the presence of such unoxidized products in any tissue; and the possibility of procuring its removal by a diet highly nitrogenized and sparingly hydro-carbonaceous is at least hypothetical, and should never lull any one into a false sense of security about ordinary fatty degeneration of the heart.

§ 70. Simple fluxes from mucous membranes are far from uncommon in aged persons. They are associated with the processes known as general decay. They may occur in any mucous membrane, either in the bladder or from the bowels, but they are especially frequently found in the lining membrane of the respiratory tract. The fluid is thin, and devoid of acrid qualities. It forms the drop so commonly seen on the tip of the nose of aged persons, especially in cold weather. That it should appear during low temperatures rather than high ones, is probably due to the effect of cold air in increasing the vascularity of the respiratory tract, leading to the better warming of the inspired air. The local hyperæmia induces it. At the same time it is usually associated with fulness of the venous radicles. In other old persons there is a free secretion from the bronchial tubes, which is not to be regarded as of an inflammatory character, or termed bronchitis, so much as bronchorrhœa. It is usually associated with a failing circulation and venous fulness. By some writers such a condition has been

regarded as a degenerative change, and so it can be viewed. It is a degraded condition of the mucous membrane, commonly associated with a languid circulation. It is a matter of much question how far astringents, or expectorants, do much good in such cases. Squill often is useful; probably from its action on the circulation. In such cases the following formula would at least be pleasant to the palate, and probably of some use to the patient as well :—

Sp. Chloroformi, ℥xx.
Tinct. Senecio, ℥i.
Syr. Scillæ, ℥i.
Aq. ad ℨi. ter in die.

If the pulse is failing or irregular, to this may be added a few drops of tincture of digitalis. In the acute bronchial catarrhs of very old persons, which much resemble bronchitis, such mixture is of great service.

Where astringents can be applied locally to rheum-producing surfaces, they may be so applied, and may consist of vegetable or mineral astringents. Especially is this the case in rheums from the intestine. But in all rheums the condition of the venous radicles and the circulation generally must be entertained in relation to the choice and selection of palliative measures.

CHAPTER VIII

ABNORMAL GROWTHS

§ 71. PATHOLOGY, simply as pathology and as devoid of practical therapeutic interest, is no part of the scheme of this work. Consequently in treating of abnormal growths there is no attempt made to go into recondite morbid anatomy. If the reader desire to do that he will find the work of Kindfleisch, translated by the Sydenham Society, such a book as he wishes. Here pathological developments will be entertained simply from a clinical point of view; and only that amount of pathological anatomy will be lent to the subject which is absolutely demanded for something like a fair comprehension of the matter.

In the first place, we are not acquainted with truly heteromorphic growths, unless indeed tubercle be such, though it is to be regarded rather as degraded connective tissue. Even the forms of cancer, which seem so far removed from anything with which we are ordinarily acquainted, are found only to be heterotopic, or heterochronic; that is, out of place, or out of time. It is a matter of considerable importance to have definite ideas about abnormal growths. They were most erroneously regarded prior to the time of careful histological investigation.

Hypertrophy.—Hypertrophy, or hyperplasia, is common in many textures; but it is with hypertrophy in muscular fibre that we are chiefly therapeutically interested. Excessive growth or hypertrophy of organs is a term rather indefinitely used. It is alike applied to epidermal thickenings on a workman's hands, to enlarged cerebral cells, to the increased bulk of one kidney

or one lung when the other has been disabled; as well as to the highly developed state of muscles due to excessive work. It has been variously regarded as a harmless overgrowth, a disease, and finally and more truly, as compensatory growth. There was a time, not very far distant, when hypertrophy of the heart was energetically assailed as a disease *per se*. Hypertrophy was a disease, an excessive growth, and palpitation, its objective symptom, was over-action. How erroneous such views are we shall shortly see. Remains of such obsolete impressions still linger in many of our text-books. They are the *vestigia* of past thought, interesting from a retrospective point of view. They have been preserved, however, as much from indolence as from any conservatism in the minds of the writers. Their present use is to indicate the line of our progress in knowledge.

Hypertrophy of muscular fibre is a thickening of already existing fibres; probably by multiplication in number rather than an increase in bulk of the fibrillæ. The consequence is an augmentation of volume in the hypertrophied part. Such augmentation in bulk we have just seen in the last chapter to be a complex result of functional activity and increased supply of arterial blood, linked together by some subtle nervous action. Thus we find that there is hypertrophy of the bladder, or rather of its muscular fibres, when a stricture, or an enlarged prostate offers an obstruction to the flow of the urine from the bladder. A similar development of muscular fibre takes place in the large intestine when a stricture in the bowel forms an obstacle to the forward progress of the fæces. There is no difference whatever between such hypertrophy, such growth, and the enlargement of the ventricular chambers of the heart when the orifice, or ostium, through which such chamber expels its contents forwards, is narrowed, or partially closed, by valvulitis glueing together the free edges of the semilunar valves. After impregnation the uterine growth is a mere development of fibres already existing in an embryonic form in the virgin uterus. After impregnation they grow and become, according to Kolliker, from twice to five times as thick, and from seven to eleven times as long as they are in their primitive state. In the case of the development of the muscular fibres in the bladder and in the bowel, to overcome an obstruction in front, no one

would call the growth a disease. And yet a precisely identical growth in the heart has been regarded as a morbid process. Not only that, but it has been thought to require remedial measures. When the aortic orifice is narrowed, and aortic stenosis exists, the walls of the left ventricle grow in thickness, and the effect of such growth is an accession of power; until the ventricle can once more drive an equal quantity of blood in an equal space of time through the narrowed orifice. It is obvious that such a result could only be obtained by an increase in the driving-power. That driving-power is the muscular wall of the heart, and by hypertrophy of it alone could such compensation be secured. And yet such compensatory growth has been denominated disease!

In the same way the enlargement of the left ventricle in aortic regurgitation has been regarded as a morbid process. But what are the real facts of the case? When the aortic valves are no longer competent, and a thin stream of blood is driven backwards through the imperfect valves, and that too forcibly from the recoil of the elastic aorta, the muscular chamber is subjected to an unwonted distending force. The effect of such increase in the distending force to which the ventricle is now subjected would be to dilate it immoderately, if hypertrophy of the muscular wall did not come in to arrest the dilating process. Under such circumstances do we find the most marked hypertrophy of the heart, the *cor bovinum*. So susceptible to any distending force is the muscular chamber known as the left ventricle, that enlargement of it takes place very commonly in mitral regurgitation. Here the blood is driven in with abnormal force from the gorged pulmonary veins (and the hypertrophied right ventricle behind them), and the left ventricle becomes dilated—unless the dilating process be stayed by muscular growth. Hypertrophy's arresting hand alone can limit the dilating action. Here we have hypertrophy to arrest distension: that is clear enough. When the ventricular chamber enlarges from inability to expel all its contents, whether this arise from debility in itself or some increased obstruction now offered to its contraction by a heightened blood-pressure in the arteries, dilatation is checked by hypertrophic growth. When a hypertrophied heart is being undermined by structural

decay, or fatty degeneration, dilatation sets in. Hypertrophy has arrested the dilating action; but when it is itself cut down in time, the dilating process is again inaugurated, and progresses without further check. Dilatation and hypertrophy are more closely linked together, and withal are much more intelligible so linked, than when treated as separate processes. There is no deep mystery about them. When there is disturbance in the equilibrium existing betwixt the driving-power of the heart and the work it has to perform, the ventricular contraction is incomplete. A small quantity of blood is left unexpelled and remains in the ventricular chamber. At the same time the blood is coming in from the pulmonic circulation, and the consequence is the ventricle yields, or becomes dilated—unless hypertrophic growth enables the chamber to contract completely and thoroughly expel its contents. In systems of imperfect reparative power dilatation becomes established under the very identical circumstances which evoke hypertrophy in others of better reparative capacity. The causation of hypertrophy and dilatation is the same; the presence of one or other indicates the capacities of the organism. We have dilatation at the commencement and at the end of the hypertrophy. The two conditions are so intimately blended, and developed in such varying proportions in different cases, that sometimes the dilatation in one case, and the hypertrophy in another case, may be scarcely, if at all, discernible. Also when hypertrophy is wearing out and being undermined by molecular necrosis, dilatation recommences, and can never again be arrested. The true and just diagnosis of the different elements of the particular stage of the case, where there is found hypertrophy of the heart-walls, with dilatation, is a matter of the greatest moment in prognosis. It is no unimportant matter therapeutically. If it be a mixed case where dilatation is being arrested by hypertrophy, the case has within it elements of promise. But if, on the other hand, it be a case where old standing hypertrophy is yielding, and dilatation is a matter rendered possible by structural decay, then the patient is going down-hill hopelessly, and usually swiftly; and no power other than supernatural can arrest the downward progress of the case.

It is perfectly obvious to all thinking minds that hyper-

trophy of the muscular walls of the heart, bowel, or bladder must not be regarded as a morbid process. That it may have some consequential outcomes not altogether beneficial is possible enough. Unalloyed good is not to be sought in the domains of pathological anatomy. Supposing that it were possible to remove this hypertrophy by any remedial measures whatsoever, what substitute for it could man devise? If it were possible to undo the compensatory growth, what good would have been achieved? The worst cases are those where the hypertrophy is imperfect; not those where it is well marked. Without the tissue-growth the case would go wrong forthwith; the hypertrophy is the saving of the system. The only rational method of affecting the hypertrophy is to strike at its causation. If it is practicable to do away with the exciting cause, the hypertrophy would pass away, just as does the hypertrophy of the left ventricle of pregnancy after parturition. Unfortunately, however, it is but rarely possible to reach the originating cause, and so the hypertrophy remains—fortunately not to be done away with by any therapeutic measure. If the attempts to reduce hypertrophy were successful the patient would have little room for gratitude to his ill-advised and mischievous medical attendant. Simple hypertrophy of the heart, without any valvular disease, is almost invariably connected with the presence of nitrogenized waste in excess in the blood. A spare diet of slops and full doses of iodide of potassium would strike directly at the cause of the high arterial tension; and, by restoring the blood to its normal quality, relieve the vascular system, and with it the chief evidences of hypertrophy. But not the hypertrophy itself; at least, not directly. The recognition of hypertrophy in a heart moderately enlarged and working quietly and steadily, and well covered by lung, is not by any means an easy diagnostic feat. This is a very different matter from the excited action of a hypertrophied heart not quite equal to its work. Walshe says:—"For my own part, I have never known the cure of indubitable hypertrophy proved by physical signs, and hold it unwise to promise any such result from treatment." Instead, indeed, of attempting to do away with hypertrophy, it is our business to do our very best to conserve it. By good food, iron, digitalis, and, if necessary, cod-liver oil, must we

strive to prevent its dissolution. By similar measures, indeed, do we hope to inaugurate it where the system is unequal to instituting it. Its treatment lies in the removal of its originating cause. In cases of hypertrophy of the bladder and bowel, something may be done by the catheter, and by laxatives. In hypertrophy of the heart with valvular disease, the only palliative is general quietude. Where the hypertrophy is associated with a condition of the blood in which nitrogenized excess is present, then a low diet, alkalies and purgatives are indicated; but not as measures acting directly upon the hypertrophy, but as striking at its cause. The chief therapeutic lesson to be learnt about hypertrophy is a purely negative one. It is this: it is equally foolish and futile to treat it as a disease.

§ 72. *Connective Tissue.*—Connective tissue is primitive tissue, from which the higher tissues are evolved, and it still forms the packing, or padding of the body. In the lungs, for instance, are blood-vessels, air-tubes, nerves and lymphatics, all held together by connective tissue. When a solution of continuity occurs, it is by means of this connective tissue that the breach is healed and the solution bridged over. In inflammation of the bowels an albuminous effusion, which becomes ultimately connective tissue, is poured out; and so the inflamed surfaces are first kept asunder, and the vermicular action of the bowels, which disturbs the inflamed parts, checked, partially at least. The bands which often tie down the visceral to the costal pleura after pleurisy, consist of similar histological elements. Of like nature is the growth which constitutes the changes wrought in the valves of the heart. The process which distorts and unfits them for the full performance of their function is a growth of connective tissue, the result of valvulitis—a parenchymatous inflammation. The changes which ensue in the different viscera, from the brain down to the kidneys, in the venous congestion which follows upon valvular disease of the heart, are due to the excessive production of connective tissue. It is this tissue which is thrown out round the fractured ends of a broken bone, and which keeps the two ends quiet, and also together. If there be much movement this growth is developed in the tissues round the callus, and so gives more complete immobility. It is by means of connective tissue that the two

ends are ultimately united. Cicatrix is connective tissue; so is keloid, but here the connective tissue is distinctly pathological. Connective tissue may remain as it is: its histological elements may undergo no change, and for years it remains in itself harmless. But under certain circumstances while so harmless it may be a source of danger to life, as in the bands remaining after enteritis, which so frequently lead to strangulation. The more normal is the tissue, the more likely it is to remain unchanged. Frequently, however, a species of mineral infiltration goes on in it; and we get the so-called ossification in parts, which is really rather a calcareous degeneration. There is a quantity of lime salts deposited in the new growth, just as they are found in the costal cartilages of elderly men. Such a calcareous ring has been formed round the heart, from the infiltration of lime into a pericardial band. Lime salts are also commonly deposited in the connective tissue of valvulitis, and give a species of stoneyness to the altered vela. This is in all probability the true pathology of what used, a generation ago, to be so often heard of—viz. "ossification of the heart." Similar changes go on in arteries which have undergone atheromatous changes, in certain organisms; and the elastic artery is converted into a rigid and brittle tube. This condition is not rarely very general; at other times it is more or less localized. It is a common cause of gangrene in the extremities, and gives the surgeon much trouble when attempting to secure the vessels, which break up when subjected to compression. It is found also in the articular cartilage of bone, as, for instance, in the porcellanous deposit of arthritis.

§ 73. Connective tissue is at once an indispensable necessity and a disease, according to circumstances. It may or may not be permanent. Frequently large masses of it are absorbed, as is especially seen in the removal of callus after the union of a broken bone is complete. At other times it is useless to attempt its removal, as in the valves of the heart for instance, or the bands formed on serous membranes.

The different measures resorted to for its removal are usually combinations of iodine and mercury. The effect of these remedies upon some formations is very curious, and even in some cases almost magical. There is, however, a marked differ-

ence between the ordinary masses of connective tissue and those growths of elements not far removed histologically, which are denominated tumours. There is little if anything to lead us to hope that true tumours are ever removed by absorbent remedies. For them there is nothing but removal by operative interference. On the other hand, masses of connective tissue are often successfully removed by the exhibition of iodine. In superfluous production of connective tissue-elements absorbents are often very useful, and much depends upon the nature of the mass, as to whether it is desirable to attempt its removal by medicinal agents, or not. The high hopes originally entertained are now much modified, and we hear little of the reduction of hypertrophied organs by iodine compared to what was said a generation ago. Now there are no surgeons who would hopefully treat a scirrhous tumour with iodine.

True pathological connective tissue is often injurious mediately from the consequences of its presence. Thus when developed in excess in the kidneys it contracts and shrivels, as is its nature, and so compresses and destroys the tubules and Malpighian bodies, and ultimately ruins the kidneys. In a similar way it grows round the lobules of the liver, and compresses and destroys that viscus, lobule by lobule. In the chronic pleuro-pneumonia of oxen it creeps round the lobules of the lung, and then, as it itself is transformed from a moist plasma into something like cartilage, it compresses the lobule of lung till it is as dense as india-rubber. In many of our chronic complaints, especially in that form of disease of viscera known as cirrhosis, there is a gradual development of connective tissue which slowly spreads; first throwing a series of soft cells round a part, and then, as they grow and harden, clasping the part in its inexorable grasp, and rendering it utterly useless functionally. As this new growth spreads and grows, the viscus becomes practically destroyed for useful purposes. Such is the effect of healthy connective tissue upon viscera. Here it produces untoward consequences merely by its presence, and the effects of that presence upon the structures of the viscus. The consequences are certain—sure; but at any rate the progress is slow usually. A very different state of matters is instituted when the connective tissue is itself the

source of trouble, as when it is too degraded to preserve its integrity, as in tubercle; or assumes a malignant form, as in scirrhus. As consumption and as cancer, connective tissue furnishes in its abnormal aspects two of the gravest and most terrible maladies to which humanity is subject.

Tubercle.

§ 74. To Laennec we owe the introduction of the stethoscope, a most valuable aid to diagnosis; to him also we owe most erroneous views about tubercle—views which have done much to retard our progress, and especially in the direction of treatment. Laennec held that tubercle was a special growth unlike any other tissue, and Carswell held that it was a secretion *sui generis*. Nothing could have been further from the mark, nor yet more obstructive to real advance in knowledge about tubercle and its associations.

The discovery by Koch in 1882 of the tubercle bacillus exerted a very great influence on the views previously held concerning the pathology of consumption. The tubercle bacilli in human tubercle are delicate cylindrical rods varying in length from $\frac{1}{8000}$ to $\frac{1}{1200}$ of an inch; many are straight with rounded ends, but others are slightly curved. No matter whether it is a nodule in any tissue or organ, and no matter whether it presents or does not present the typical pathological—both gross and minute—characters of the classical tubercle, no matter whether it is in man, or in the bovine species, or in the sheep, the monkey, the dog, cat, rat, mouse, rabbit, guinea-pig, fowl, or ostrich, if in such a nodule the bacilli, characteristic of tubercle, can be demonstrated, that nodule is tubercle, and the disease is tuberculosis. "The discovery by Koch of the fundamental fact marks one of the most brilliant and most practical discoveries of modern medical science; the diagnosis of tubercle once so difficult to make certain, is now by means of the demonstration of the presence of the tubercle bacilli, one of the easiest and at the same time one of the most important helps in the formation of a correct diagnosis in many otherwise doubtful cases. Koch further proved that not only are these particular bacilli present in all and every tubercle

of man and brutes, but he also showed that these bacilli can be artificially cultivated outside the animal body, and with such cultures by inoculation typical and general tuberculosis can be produced, the tubercles thus produced again containing the same tubercle bacilli; in short he conclusively established that these bacilli are the *vera causa* of the disease tuberculosis" (Klein, *Micro-Organisms and Disease*).

Tuberculosis is common in man, and in animals kept in confinement, but it is not met with in animals leading a life of freedom. Many birds such as fowls, pigeons, pheasants, and turkeys, are extremely susceptible to it when reared for domestic purposes. This avian tuberculosis is not readily transmitted to other animals, but for all that it is essentially the same disease as human and bovine tuberculosis.

The great characteristic of the bacillus tuberculosis is that when it invades the body it produces miliary tubercles—small whitish nodules, which are usually very numerous, and by their aggregation form large masses. The cells of which they are formed undergo a process of degeneration usually spoken of as necrosis or caseation. This caseation may be a specific action of the bacillus, or it may be due to the action of a chemical substance secreted by the bacilli. The softening of the caseated matter and its expulsion in the form of expectoration results in the formation of cavities in the lungs. In favourable cases and under favourable conditions the caseated matter may undertake a retrograde change and become calcified. A more common change is that of fibrosis, which is set up at the periphery of the nodule, and is secondary to the inflammation which has been excited.

The symptoms produced by tuberculosis vary somewhat with the structure or organ primarily affected. The most common form is that of tuberculosis of the lung, where it produces either acute miliary and caseous tuberculosis, or chronic pulmonary tuberculosis. The pleura is rarely primarily affected in man, but there is often an extension of the disease from the lung itself. Empyema again may be tubercular in origin, whilst many cases of caseous pneumonia are derived from this source. The peritoneum may be infected either directly or as the result of an extension from the intestines. In children intestinal tubercular

infection is often associated with enlargement and cascation of the mesenteric glands—tabes mesenterica. Meningitis is often the result of a deposit of miliary tubercle, and tubercular nodules are not uncommon in the brain. Tuberculosis in the cancellous parts of the bones associated with the formation of pus is a very common form, the bones entering into the structure of the larger joints being frequently involved. Many cases of Addison's disease are undoubtedly tubercular in origin, whilst it has long been recognized that lupus is only a chronic form of the complaint.

In cases of phthisis the sputum contains tubercle bacilli, often in great numbers, and these retain their vitality, and under suitable conditions are capable of growing and producing tubercle bacilli for a period of at least three months, and probably very much longer.

One great gain of the discovery of the bacillus was to break down all distinction between phthisis, tubercle, and scrofula, distinctions which in view of the numerous connecting links furnished by clinical experience, had long been suspected to be purely artificial. Long before Koch's great discovery it was known that tubercular disease could be inoculated. The credit of first inducing tuberculosis experimentally is due to Klencke, who in 1843 made a series of observations on the subject. His work attracted but little attention, and in 1865 Villemin published a series of carefully-planned experiments bearing on this question. Chauveau obtained similar results, although they differed somewhat in matters of detail. Koch showed that the results of inoculation of animals with tuberculous matter were always the same. The inoculation method, when guinea-pigs are employed, gives results free from any trace of ambiguity. The positive results are more decisive than the discovery of the bacillus tuberculosis, whilst the negative indications are almost as valuable as the positive.

The fact that phthisis is contagious is now fully established. Many experiments have been made of late years, especially since the discovery of the tubercle bacillus, with the view of testing the contagiousness of consumption. One of the most exhaustive of these investigations was undertaken by Dr. Cornet, whose conclusions were published in the *Zeitschrift für*

Hygiene. He examined the dust of rooms recently inhabited by phthisical patients. The dust was collected from the neighbourhood of the patients' beds, but at such a distance from them that it could not have been contaminated either by direct contact with the patients or their expectoration. A definite quantity of this dust was introduced into the bodies of guinea-pigs to test its powers of infection. The experiments made were very numerous, nearly four hundred animals being used for the purpose. Of these as nearly as possible one-half died from acute infection, whilst a large proportion succumbed to peritonitis, the proportion varying according to the source from which the dust was obtained. It was found that the virus of the tubercle was by no means widely distributed, and that it was concentrated in the vicinity of patients suffering from the disease. As long as the sputum remained moist it was practically harmless, for it was only when it became dry that it was wafted about in the surrounding atmosphere. It was found that one of the most certain ways of disseminating it was to expectorate into a handkerchief and then allow it to dry. The dust of a room which has been inhabited by a person suffering from phthisis is a source of danger to other people when inhaled, especially when they are predisposed to the disease. But it is only the dry sputum which is dangerous.

In some of Koch's experiments the sputum of tuberculous patients was allowed to dry in much the same way as expectoration may constantly be seen drying on the pavement of the streets and on the floors of places of public resort, and when injected into guinea-pigs and other animals was found to induce the disease with absolute certainty even after having been kept for many months. In connection with the subject of the contagiousness of phthisis, it may be as well to point out the risk to which healthy people are not infrequently exposed from consumptive fellow-travellers, especially on board ship. It has long been the custom for medical men in this country to send their phthisical patients for a voyage to Australia, a sailing vessel not infrequently being selected for this purpose. "The position of a traveller who finds himself condemned to pass several weeks cooped up in a small cabin with a passenger in the last stage of consumption is by no means an enviable one,

especially when the vessel is crowded, and there is no possibility of finding other accommodation. The invalid naturally enough passes most of his time in his berth, and displays a considerable dread of anything like efficient ventilation. The only course open to the victim of this unfortunate combination of circumstances is to insist firmly on the patient being removed to the ship's hospital. When a passenger is suffering from phthisis, that fact should be notified to the authorities at the time of taking the passage, and should this precaution be neglected, the captain should have power, on the advice of the ship's surgeon, to refuse so dangerous a person, or to put him ashore at the first convenient opportunity. Consumptive patients should be assigned cabins to themselves, either separately or in common, and steps should be taken to see that their expectoration is disinfected. At the end of the voyage the whole of the fittings should be removed, and the cabin itself should be thoroughly fumigated before being occupied by another passenger" (Murrell, *The Prevention of Consumption*).

It is an undoubted fact that phthisis of late years has become much more common amongst the girls and young women at Mentone, Davos, and other well-known health resorts, especially amongst the washerwomen, who constitute a numerous class, and there is reason to believe that in many cases contagion has arisen from washing the linen soiled by the sputa of consumptive patients.

In many of our high-altitude health resorts the atmosphere of the public rooms, especially during a spell of bad weather, is not all that could be desired. The visitors, most of whom are suffering from some form of lung complaint, are often unable to get out for days together, and as the place is warmed by stoves, and every breath of fresh air is religiously excluded, it seems not improbable that in many cases more harm than good is done.

The omnibuses in London and other large towns which ply on the routes leading to and from the various hospitals for consumption have been described as veritable death-traps. The patients expectorate into the straw, and when the fine weather comes, every passenger on his entrance and exit raises a cloud of dust laden with the bacillus of tubercle (*Prevention of Consumption*).

§ 75. A subject of much importance is the consideration of the circumstances which affect tubercle; which keep it away or encourage its advances, or which arrest its progress when established, and stay its ravages. The hopeless pathology of Laennec and Carswell had nothing but a grave as the future of those who were smitten with tubercle. Now we know that recovery from conditions either actually tuberculous, or tending to tubercle, is very common. Some cases, it is true, do badly, and the system sinks under the long process to which it is subjected, but this is usually the result of the adoption of antiquated methods of treatmeat. The hectic fever, the night sweats, the harassing cough, the general constitutional irritation; the loss of appetite and of digestive and assimilative power, sometimes wear out the powers of the system; but in skilled hands life may as a rule be prolonged almost indefinitely. There are thousands of recoveries from this terrible condition; so many indeed as to encourage us to inquire into the factors which lead to recovery. If there are conditions which render recovery feasible it is clearly our duty to discover what those conditions are; how they are brought about; and by what means they are best secured. The consolidation and destruction of the lungs, which form the anatomical basis for consumption, are usually the products of inflammatory action, and the greater the quantity of cellular elements collected in the vesicles, and the longer the duration of the inflammation, the more readily will pneumonia lead to consumption, since these are the conditions most favourable for the production of caseous infiltration. Secondly, pneumonia resulting in caseous infiltration occurs most frequently, but not exclusively, in puny, badly nourished subjects. This is partly because such persons are especially delicate, and in part because all inflammatory nutritive disorders by which they may be affected show great tendency to copious cell-formation, with subsequent caseous degeneration. The production of the cellular elements is in inverse proportion to the quality—the higher the fewer, the lower the greater in quantity. The caseous masses upon which the consecutive (secondary) development of tubercles in the lungs depends are situated in the great majority of cases in the lungs themselves, and consist of the products of chronic

pneumonia in a state of caseous degeneration. The greatest danger for the majority of consumptives is, *that they are apt to become tuberculous.* It is in this that the course of simple chronic pneumonia—probably a very much commoner complaint than we imagine, because it is not sought for by systematic investigation—differs from that pyretic state of hectic fever described in common parlance as "going consumptive."

The etiology of tuberculosis is centered round the bacillus tuberculosis, and when this does not enter the body no tuberculosis can be manifested. Tuberculosis in common with other infective disorders is a febrile disease, and has its period of incubation.

It is obvious that the rational method of treating tuberculosis is to restore matters to that condition which existed before the patients became tuberculous; and which obtains in those who do not become tuberculous. In order to do this it is necessary to consider the different circumstances which lead to the patients becoming tuberculous. First there comes the question of heredity. It is notorious that in some families the tendency of every form of cell-growth, especially cell-formation of rapid growth, or of inflammations, is to degenerate into tubercle. They are known as consumptive families. Their tissues bear the brand of inheritance. They readily yield and become tuberculous if placed under the following circumstances; which have much to do with the production of tuberculous degeneration. Imperfect nutrition, unhealthy surroundings, and especially an insufficient dietary are the factors which lead most directly to the formation of tubercle. The want of fresh air, the imperfect removal of oxidized, or rather partially oxidized products, have much to do with tuberculous degeneration. The effect of fever, and especially enteric or typhoid fever upon the nutritive processes, is such that tubercle commonly follows any chronic pneumonia in the convalescence of these patients. Long-continued inflammatory action may lead to similar results. Sometimes the effects of inflammation of the lungs upon the system in a perfectly healthy subject are so grave as to lead to degenerative changes in the inflammatory products. One of the commonest causes of general constitutional debility favouring tuberculous degeneration is rapid growth.

The tax upon the powers of the system is commonly manifested in the tendency which then obtains for any cell-growth to develop a tuberculous character. Long periods of partial starvation, of imperfect nutrition, also render the tendency to such change very marked. It is a matter of personal observation that tubercle in a retrograding condition, on its road towards one of the forms of repair given above, is common in the lungs of sheep or of cattle, which have been previously underfed during the preceding winter, but which have fattened sufficiently for the market during the ensuing summer. Masses of tubercle, the size of a billiard ball, encapsuled by healthy connective tissue, together with similar masses undergoing cretefaction, are far from uncommon in the lungs of young cattle slaughtered for the food of man,—and fairly good, wholesome fat meat they furnish. In sheep the tubercular masses are rather those of millet-seed shape and size, and masses of the size of a hazel-nut are rare. Occasionally in both animals, cavities, lined with a species of membrane, and surrounded by healthy lung tissue, are found; marking the process of elimination by softening and expectoration.

§ 76. The foregoing series of factors, standing in a causal relationship to tuberculous degeneration of inflammatory cell elements, points very clearly in the direction—that imperfect cell elements are due to a low tissue-producing power in the organism, either congenital and inherited, or acquired; occasionally both combined. Especially, then, will tubercle manifest itself in those who, naturally delicate and predisposed to tubercle, reject all fat. It is well known that fat is wanting in tubercular tissue—that in other words the absence of fat is a great cause of tuberculous degeneration in inflammatory products. A rapid cell-formation in such individuals is commonly followed by tuberculous degeneration. Such is the actual history of much of the tubercular consumption we see around us. Dampness of subsoil undoubtedly exerts a very powerful influence; but the unwise yet prevalent custom of permitting children to leave all the fat of their meat on their plates untouched, is an equally powerful factor. It is just those slight, fragile forms, to whose systems fat is so absolutely necessary for healthy tissue-building, that reject fat most

persistently; and where the parents should most steadfastly insist upon their taking fat—in some form or other. When once they can be induced to take fat the dislike to it vanishes, and not rarely becomes transformed into a positive craving for fat, in which case a cure, or its equivalent, is not rarely achieved. Such is one of the greatest of our curative agents: it is equally potent as a preventive measure.

When, then, we find good reason to suspect the presence of tubercle, or a tuberculous tendency in a patient, it becomes imperatively necessary to institute a distinct line of treatment. In passing it may be observed, that it is very unwise to rest the diagnosis of tubercle too exclusively upon physical signs in the lungs, as too many practitioners, and especially juvenile ones, in their full-blown zeal for physical examination, are apt to do; to the neglect of the many other equally important factors which only reveal themselves to the much more difficult observations of a brain trained to observe and reflect—to estimate the *tout ensemble* of the case, and correctly appraise the family and the individual history of the patient. Having arrived at the conclusion that there is present in the organism connective tissue of a lowly form, or undergoing tuberculous change, the next question is—How to treat that patient? If there be no rise of temperature, or it be only a fifth of a degree or so, it is desirable at once to commence a plan of improving the nutrition. The food must be easily digestible, and furnished to the system in liberal quantities. It must be slowly consumed, and where necessary slowly and deliberately masticated. There must be a period of quiet maintained after each meal. The bowels must be kept open; and the digestive powers be well sustained. Frequently there is some gastric irritability interfering with digestion and assimilation. Here the following forms a capital mixture:—

Bism. Carb. gr. x.
Pot. Bicarb. gr. v.
Mist. Acaciæ, ℥i.
Inf. Calumbæ, ad ℨi.

three times a day before food. Many practitioners regard such mixture, or bismuth with tragacanth, as their sheet-anchor in

incipient phthisis. The food should be such as not to tax unduly the digestive powers. It might consist of milk with farinaceous foods, as tapioca pudding, arrowroot, maccaroni or bread puddings, various nutritive soups, fish in various forms, and still more oysters and other bivalves; meat, either cut very thin, with a fair quantity of fat, or carefully minced and not too highly seasoned, poultry, game, &c. Eggs in various forms are very pleasant, especially when done with butter, as follows. "Break four eggs into a basin, beat them well. Put a teaspoonful of cream, or of milk with a piece of butter in it, into a pan, with a little salt; when the cream is warm add the eggs, and keep stirring until the mess thickens, and then pour it into a dish, with or without buttered toast at the bottom. The mixture should not boil. Time five minutes." Various glandular bodies, as sweetbreads, may be tried; plain boiled, and eaten with butter, pepper, and salt, they form an eligible article of diet. Marrow is also very suitable. The leading idea is to give fat, or fat-forming material, in such guise as shall be least objectionable to the patient's tastes, and at the same time most easily assimilable; and thereby to modify the cell-formations taking place in the body. If there already exist masses undergoing a process of degradation, they may be surrounded by a wall of healthy connective tissue, within which they are comparatively harmless. Cod-liver oil is the most readily and easily digestible of all forms of fat. It was in the recognition of this fact that J. Hughes Bennett laid the world under a debt of thanks to him, and demonstrated so palpably the aid physiological investigation can give to practical medicine. Cod-liver oil should be given after food, and then it is acted upon by the pancreatic secretion and emulsionized. It is also best borne by the stomach when so given; frequently if given before food, a most unphysiological time to administer it, it disagrees, and often it is not tolerated, but rejected. It is an excellent plan to commence with a combination of the oil with extract of malt and then to proceed with a plain and comparatively tasteless oil. There are various vehicles in which the oil may be taken. Milk, solutions of gums, orange wine, lemon juice, and cinnamon water are recommended. Cod-liver oil may be taken in quantities varying from a teaspoonful to

an ounce, daily, according to the requirements of the case and the digestive powers of the patient.

It frequently happens that the appetite of the tuberculous patient is capricious in the morning, and that breakfast is not a good meal. This is a grave matter, and it is ever better when a good meal is taken and digested to commence the day with. Every means should be taken to secure a good breakfast if possible. One of the best measures is to give the well-known rum-and-milk in the morning, ere dressing. The following is the best formula for it:—"Take half a pint of new milk and add to it an egg, a teaspoonful of powdered sugar, some grated nutmeg, and one or two teaspoonfuls of good old Jamaica rum: stir all together well, and let it be taken by the patient in bed." It is desirable that a little further rest in bed should precede the process of dressing. After such preparation breakfast is commonly enjoyed and assimilated.

It is often desirable to whet the appetite with some bitter infusion with acid, about half-an-hour before each meal. Phosphoric acid with gentian does very well. Chalybeates are best taken after food when used as a hæmatinic. By such a course of treatment, combined with well-ventilated bedrooms, plenty of fresh air free from impurities, and good warm clothing, many a case can be turned from its downward progress, and a process of repair be instituted.

The question of climate is one of much importance. There is no doubt that a change of climate is often very beneficial. It is not always easy to say what that change shall be. To many the shores of the Mediterranean are distinctly preservative, and their winters should be spent, when practicable, amidst orange groves. Others again require a different climate, and the slopes of the Himalayas, the Californian Sierras, the Blue Mountains of Virginia, the high Swiss valleys, &c., give them the best chance of life. A long sea voyage to Australia is the salvation of others. How to decide in each case is very difficult, and the young practitioner will be prudent who defers the selection to some well-known authority. Whether the mild climate, furnishing a soothing air to the diseased lungs, or a bracing climate, improving the general tone, shall be chosen is often a matter not easy of solution. It is a still graver matter

often to decide whether an invalid shall be sent away with the prospect of dying among aliens in a foreign land, on the chance of a very hypothetical possibility of recovery; or to let the sands of life run out at home. The reaction is setting in in the favour of the latter. A foreign tour is very well in some cases; in others its recommendation is simply cruel.

§ 77. When the tuberculous degeneration is producing hectic fever, and the softened mass is being expectorated by means of an opening into the bronchial tube, another series of symptoms is developed. The ulceration around the periphery of the tuberculous mass, which opens the way out, usually creates some fever. Frequently the fever is sharp. The mass too acts like a foreign body, and produces irritation which evokes the reflex act known as cough. The irritation being persistent, the cough is frequent, harassing, and often so continuous as seriously to interfere with the rest at night. Indeed, ere a way out is secured for the softening mass, by which the system is relieved, very commonly a period is passed through which gravely threatens the existence of the organism. Great emaciation and exhaustion mark the time of trial. Here stimulants, nutritive food, and alcohol are required, often urgently. Wine is especially serviceable: it is a stimulant, while the alcohol is a readily available food. In full doses, too, the alcohol lowers the febrile temperature, and so is still further useful. Cream with sherry, or a liqueur, eggs and brandy, milk and seltzer-water, as a beverage, wine, whey, coffee with rich milk, or cocoa and milk, are all indicated, and in liberal quantities too. The question is whether the storm that is brewing, or already blowing, can be weathered or not; if the organism can be sustained till the gale has blown over all may yet be well. For this end free supplies of easily assimilable food are necessary—absolutely necessary.

Another great point is the question of what to do when the sleep is much broken by cough. When the cough is very wearing it is highly desirable that something be done. Unfortunately the means of palliating the cough are often very objectionable. Full doses of opium or morphine, however administered, will assuredly destroy the appetite and ruin the digestive powers. Small doses are infinitely better. A cough linctus for frequent use should not contain more than three

minims of the liquor morphine acetatis to the dose. It is usually made up with syrup of tar or syrup of lemons and water. Hypodermic injections may be resorted to, or a morphine suppository may be given for the relief of pain, but are rarely required to allay cough. The following is a good form of night draught :—

Pot. Brom. ℈ i.
Tinct. Hyoscyami, ℥ ss.
Mist. Camph. ℥ i.

This affects the reflex mechanism, and lessens the cough. At other times ammonia and Cannabis Indica seem beneficial. Often the night sweats are profuse, and then oxide of zinc or belladonna or atropine may be prescribed. A large bedroom well ventilated is ever desirable.

Under all circumstances it is very necessary that rest, as far as is possible, be given to the diseased viscus. In all inflammatory conditions rest is clearly indicated. Quiet permits of the reduction of the hyperæmia which is the initial step of the inflammatory process, whether simple or tuberculous. It is the impossibility of securing perfect rest that renders the presence of tubercle in the lungs and bowels so much graver than is its appearance in an ordinary gland. The constant movements of the lungs, and of the bowels, cause a further development of connective tissue, just as does the movement of a broken limb call out callus; and this new formation takes on in its turn tuberculous degeneration. If rest could be secured this secondary formation might be avoided. The objections to opium have been given above, but other means of securing rest may be tried. In tubercle of the bowels rest may be partially secured by checking any tendency to diarrhœa, which increases the vermicular action of the intestines, and for such purpose myrrh is often useful. It may be given with bismuth in powder, ten grains of each, at bed-time, especially with a grain and a half of powdered opium. Strapping that half of the thorax in which the tubercle has shown itself, is an excellent plan for securing partial rest to the lung in pulmonary tuberculosis. Cough, too, irritates the affected parts mechanically, and should be avoided. Perhaps some day we may discover a remedy which will so deaden the nerve

centres as to arrest to a large extent those reflex actions which, though often useful—as when a crumb is in the larynx—at other times are an unmixed evil. If such an agent could be discovered it would be most precious in the relief of the cough of pulmonary tuberculosis. For the cough is very irritating as well as exhausting, and there is no hope of the irritant mass being expectorated, until it is softened and has a way prepared for it; after which the cough is very useful.

The treatment of the night-sweating of phthisis is a matter of considerable importance, and demands detailed consideration. One of the oldest and at the same time one of the best remedies for the alleviation of this distressing symptom is oxide of zinc. It may be given either as a powder, or it may be made into five-grain pills. A single pill at bed-time will often answer admirably, but to be quite on the safe side two pills should be given, either both together at bed-time, or one at bed-time and the other in the early morning. Oxide of zinc has no toxic action, and there is no fear of giving too much. Sulphate of zinc will also check sweating, but as in large doses it acts as an emetic, the oxide is preferable.

Belladonna and its allies and the alkaloids extracted from them with their derivatives are powerful agents for checking sweating. Belladonna, Hyoscyamus, and Stramonium form a natural group not only botanically but also from a pharmacological point of view. Both light atropine and heavy atropine are anhydrotics, and homatropine has similar properties. If no other preparation is available, a dose of ten minims of the tincture of belladonna, if of good quality, will answer the purpose admirably. The dose of sulphate of atropine is from one-hundredth of a grain to one-eightieth of a grain, and it may be given either by mouth in the form of a pill or subcutaneously. A single hypodermic injection of one-eightieth of a grain at bed-time will often check the sweating, not only on the night on which it is given, but for several consecutive nights. Larger doses are often recommended, but the dose here indicated answers every useful purpose.

Another good remedy for this particular symptom is picrotoxin, the active principle of Cocculus Indicus. It should be given every night at bed-time in the form of a pill containing one-

sixtieth of a grain. This is a mode of treatment which may be resorted to with the utmost confidence. Practitioners who fail to use this remedy deprive themselves of one of the most valued agents in the treatment of phthisis.

Amongst other remedies may be mentioned pilocarpine in small doses, one-tenth of a grain of the hydrochlorate in a pill three times a day. Muscarine, the active principle of certain poisonous mushrooms, has a similar action, whilst the agaric of the larch has a well-established reputation.

The following prescription may sometimes be found useful when the night-sweating is associated with obstinate constipation :—

Morphinæ Mur. gr. $\frac{1}{3}$.
Atropinæ Sulphat. gr. $\frac{1}{80}$.
Pulv. Capsici, gr. i.
Pil. Aloe et Myrrh, gr. ii.
To make a pill. One to be taken at bed-time.

In this connection it may not be out of place to mention a mode of treatment which in the hands of an old irregular practitioner gained for him a high reputation for the treatment of phthisis. It consists in sponging over the patient with hot vinegar, holding in suspension a quantity of powdered capsicum. A teacupful of vinegar made hot and a teaspoonful of cayenne pepper were his quantities. About an hour before the usual oncome of the profuse night or morning sweat, the patient should be sponged over freely. The effects really are very satisfactory; nor do the patients so treated complain that the process is disagreeable. When there is obstinate diarrhœa the compound kino powder of the pharmacopœia may be given in ten-grain doses, followed if necessary by the following pill :—

Cupri Sulph. gr. $\frac{1}{2}$.
Pulv. Opii, gr. $1\frac{1}{2}$.
Confect. Rosæ, q. s.

Sometimes a vegetable tonic with some acid, as

Liq. Strychniæ, ℥iv.
An. Phosph. Dil. ℥xv.
Inf. Gentian, ℥i. ter in die,

may conveniently be taken before meals. But at other times the tongue is raw and irritable, or denuded of epithelium in patches. Here it is necessary above all things to attend to the state of the stomach. Milk, sheathed with alkalies, must be the food; the alkaline bismuth mixture with or without bromide of potassium, the medicine. Until the tongue indicates a more normal condition of the primæ viæ, the greatest care must be taken, and no movement be made carelessly. At other times the tongue is furred, and then it may be necessary to give a mixture of nitro-hydrochloric acid and infusion of cinchona thrice daily; with a compound colocynth and calomel pill at bed-time every alternate night. Or at times ten drops of Tincture of Nux Vomica in an ounce of a gentian and rhubarb mixture may be indicated instead of the acid mixture. As long as the tongue is raw and irritable, or covered with a brown fur—a layer of dead epithelium cells—it is useless to give iron and cod-liver oil. The tongue is the index of the intestinal canal, and it is often more essential to study the tongue carefully than to make minute observation as to the physical signs in phthisis. After the night sweats are arrested and when the primæ viæ have been placed in a normal state, then it may be well to administer hæmatics and to order cod-liver oil—but not precipitately, nor with undue haste. How often this mistake is made, time lost, often never to be regained; a backward step taken, and slow onward progress alone attainable in the future; is not a pleasant matter for retrospection. The ground lost by hasty adoption of a tonic treatment is sadly too often never regained. Still too great timidity may also lead to untoward results.

Then as to hæmoptysis. In the early stages, when there is consolidation without softening, the bleeding does good and relieves the vascular congestion, often with markedly good results. Such hæmoptysis, which is very variable in amount, is prognostically very different from hæmoptysis due to a softening mass opening a pulmonary blood-vessel, or that from an aneurism in an old cavity; the first is salutary, the others fraught with imminent danger to life. In the first form of hæmorrhage it will commonly be found that there is coexistent constipation. Nothing is more common than to find a patient

returning to the hospital, complaining of hæmoptysis, after a brief absence. Especially is this the case where the mixture has contained some sulphate of magnesium, and constipation has followed its discontinuance. As to the other two forms of hæmoptysis, recurrence is not usually possible; nor have we any means of controlling such hæmorrhage except by allowing syncope to come on naturally, and then permitting the patient to remain perfectly quiet. To arouse such patients from their syncope by stimulants is to reinaugurate the bleeding; to move the patient is to run the risk of disturbing the blood-clot formed.

The inhalation of turpentine and the application of ice to the chest are unobjectionable.

In obstinate or profuse hæmoptysis nothing is more useful than the application of the dry cupping-glasses over the back. They are easy enough to apply, but curiously enough many students go through the whole of their curriculum without seeing them used.

Blistering the chest may be adopted, and some practitioners attach value to it; others repudiate its utility entirely. When there are sharp pleuritic pains, blistering seems to furnish relief. Strapping the chest, so as to abolish as far as possible all movement of the affected side of the thorax, after the plan of Dr. F. T. Roberts, often gives great relief. All mechanical irritants, as flour, dust, feather-particles, steel-particles, dust from pot-making, woollen particles, &c., should be studiously avoided, as calculated to further disturb a diseased lung. Air pure and fresh, and free from the presence of mechanical irritants, is very beneficial.

All cough medicines containing large doses of opium or morphine are to be avoided except to procure sleep at nights. Of all the insidious paths to the grave there is none so sure, so dangerous, so fraught with immediate peril, as that which is strewn with opium. For disease below the diaphragm opium is invaluable; but in thoracic mischief it should be prescribed with the utmost caution and only in small doses. In large doses it relieves the cough often only too effectually, for it arrests all action—reflex and other—by death. It ruins the appetite, locks up the bowels, and simply smooths the patient's path to

the grave. Chloral is worse, if possible. Bromide of potassium is comparatively free from ill after-consequences. Where there is a history of syphilis its association with lung mischief must not be overlooked, and some of the solution of the bichloride of mercury with iodide of potassium may be indicated. With careful attention to the dietary, and the measures described above, many patients will recover, or at least make a temporary stand, whose cases, at first sight, present apparently little prospect of any good being attained.

Finally, if a tithe of that care, of the good food, and of the fresh air of convalescent homes in the country, could be given to tuberculous cases at the outset, which sentiment provides for the closing of the scene, how different would be the end achieved. It is not our desire to undervalue these solaces to the dying which are furnished in no stinted quantities, even by Philistine boards of guardians; far from it. What we wish to do is to point out how inestimably valuable the same measures would be, if available before the cases became markedly tubercular. Often sentiment furnishes, when too late, what would have been priceless at an earlier period. In hospital practice it is heart-breaking to see case after case merging into tubercle which might have been arrested if power to procure such things as these cases require, existed. Medical advice, medicine, and cod-liver oil can be given; but wine, stout, meat, are only to be procured by making the patient a pauper. When this step is taken and the case is hopeless, everything is furnished to prolong the last scene—in order that they may not die unsuccoured. Had that succour come out of intelligence, and been given in time, a life might have been preserved; instead of merely a deathbed being made somewhat less repulsive than it otherwise would have been.

Cancer.

§ 78. If tubercle be infinitely more common than cancer, cancer is still more hopeless, and still more dreaded. It is indeed an intruder of grim mien, and of grave import. Nevertheless it is but a modification of connective tissue. Rokitanski, in laboured phrase, says of cancers:—"Heterologous growths not

distinguishable from sarcomata by definite generic marks, and like these, to be dealt with only as species; but contrasting with sarcomata in the single feature, common to them all, of malignancy. Carcinomata originate and subsist not rarely as local evils. Far more commonly, however, they are associated with a dyscrasis, which, in point of fact, often precedes and engenders the cancer. Hence the multiple appearance of carcinoma as the sequel to a single one, as the sequel to the extirpation of a voluminous and hitherto solitary one. Hence, in other cases, the original appearance of cancer in several organs simultaneously, or in rapid succession." Cancer is a modification of connective tissue, which shows itself under certain peculiar circumstances often of a puzzling character. It is common at the junction of skin and mucous membrane at the lip, and anus. And yet it almost never attacks the upper lip. It is common in the uterus and in the mammæ, and often arises at the change of life, when there is a certain hypervascularity of these organs present. At a corresponding age it is common in the stomach in the male. It is induced in the scrotum by soot, as chimney-sweeper's cancer. At other times it is more diffused, as if a cancer-building tendency existed throughout the organism. It is even supposed that such tendency lurks in many cases, without actual existence of cancer-cells, until a blow or other injury develops them locally.

Cancer will proceed from its primitive seat along the lymphatics, as is well shown by the secondary glandular enlargements which so often follow mammary cancer. Cancer-cells, when washed off into the blood-current of a vein, will float along until arrested; and then will at once grow and set up a cancer colony. Thus in cancer of the pylorus a tiny speck of cancer often breaks off into the gastric vein, and then becomes arrested, in the subdivisions of the portal vein, in the liver; the point of its arrest becomes a nodule of secondary cancer. A cancer-cell may wash away from this secondary nodule, and become arrested in the subdivisions of the pulmonic circulation, and so become a secondary cancer colony in the lung. In some cases cancer-cells form a mass in the lung, wash into the pulmonary veins, and, passing through the left heart,

drift along the arterial current into the cerebral vessels and establish another cancer colony in the brain. Another curious and interesting fact about cancer is this: The histological elements of cancer are not neoplasms, not new growths. They are a development of textures, normal in their place, or at their own time, but forming under other circumstances malignant growths. Thus scirrhus is scarcely, if at all, distinguishable from cartilage. The rapidly-growing osteo-cephalomatous, or cerebral cancer, which is connected with bone, is the growth of a tissue in adult life, which is normal in fœtal life as the marrow cells of bone. Colloid cancer, a gummy mass, common in ovarian disease, is nothing more than the sarcode of the umbilical cord; which is useful in its place. Creighton has demonstrated that the cells in mammary cancer are allied closely with the cells formed in the breast of the impregnated female before the secretion of milk is set up; and with those cells found in the still large mammæ after the flow of milk has ceased.

Another thing about cancer is this—any abnormal growth, as a fatty tumour, for instance, is in mature life apt to become cancerous, just as we saw that inflammatory masses in certain organisms become tuberculous. Consequently it is very desirable to remove such tumours, in order that they may not become the subject of cancerous change.

§ 79. Looked at from a therapeutic point of view, those modifications of connective tissue known as the varieties of cancer, are of a depressing and hopeless character. When they present themselves in situations where the surgeon can reach them their removal by operative measures is clearly indicated. In many cases such removal is effective. In other cases, where there seems to be a general constitutional tendency to cancer, such extirpation is of little avail, and is followed by cancerous manifestations elsewhere. Whatever means for the removal of the cancer be adopted, the extirpation must be complete. If the end of a cancer prolongation, often very like a crab's claw, be left, the cancer will grow again. If a cancer-cell be travelling up a lymphatic, and is not included in the operative measure, it will institute a secondary cancer in the first lymphatic gland it reaches.

There are two points where a medical opinion affects the

purely surgical question of removal. One is, that in very old persons hard cancerous growths are as well let alone. The sufferers will probably die off ere the cancer itself is fatal The removal of the cancer may, however, become desirable in consequence of the pain it occasions. Another is this: if there exist any evidences of the presence of cancer in the viscera, then surgical interference is clearly contra-indicated. Recently a case came under notice where on examination it was impossible to pronounce the left lung quite normal. It was probably cancerous, as the subject was a hale woman of over forty years of age with a gouty diathesis. She had had one mamma removed for cancer, but the operation was not quite successful. An opinion against further operation was given accordingly. Ultimately the case fell into the hands of a cancer quack, who inflicted much torture by his measures for removing the cancerous cicatrix. The lung symptoms rapidly increased, and the dyspnœa became intense, and ultimately killed the patient.

Cancer is usually regarded as a painful ailment. There are, however, no nerve fibrils in the cancerous mass, and cancer is painless where it does not involve pressure on a nerve. So strong is the popular impression that if there be no pain the tumour is not malignant, that it is sometimes simply impossible to convince the patient that he, or she, is the subject of cancer. Yet cancer is in itself absolutely painless, and, if it develop in a part free from nerves, occasions no pain. If, however, a nerve becomes implicated, especially if enclosed in the remorseless grip of scirrhus, then persistent, enduring pain is induced. So severe and excruciating is the agony inflicted by cancer, that Montgomery wrote of uterine cancer, "There is no temporary relief but in opium; no permanent rest but in the grave." Few diseases are more terrible than stricture of the œsophagus, or cancer of the pylorus. The subcutaneous injection of morphine and rectum-feeding may prolong a life which must have become a burden; and relieve an existence otherwise intolerable. In the last stages of gastric cancer ice often gives great relief to the vomiting. When cancer assumes a phase of rapid growth emaciation is marked. The system is robbed to feed the intruder, and drained that its destroyer may wax and grow. This, however, is a less agonizing mode of death than that pro-

duced by pain alone—by the torture which results when nerves are caught by masses of malignant connective tissue.

The questions of fatty tumours, of adenocele, of recurring fibroid, and other growths, are too purely surgical to demand our consideration here. The more special requirements of abnormal growths, according to their individual exigencies due to their position, will be given in the chapters to be devoted to the diseases of the different systems.

CHAPTER IX

BLOOD-POISONS—SPECIFIC POISONS

§ 80. The term blood-poisoning is so vague that it is impossible to define it with any approach to accuracy. In the first place a blood-poison, in the sense in which the term is commonly used, is a material which finds its way into the blood, after the manner of what are known as specific poisons. But there does not follow a definite group of symptoms and changes such as characterize each of the exanthems, and make measles and small-pox so distinct and distinguishable, in the case of what are known as blood-poisons; though pyæmia and erysipelas possess some fairly special characteristics. The tendency is ever towards an asthenic type of pyrexia, a quick pulse, a high temperature, both increasing towards evening; a dry skin, a loaded tongue with a foul breath, much depression of the nervous centres, together with a generally ominous appearance, which must be seen to be understood—but once seen ever again recognizable. It is very noticeable in cases of erysipelas in persons of broken-down constitutions; in some children with ulceration of the throat; in those who having assisted at a *post-mortem* where there was erysipelatous peritonitis, are struck down by blood-poisoning; or, again, at times after a puncture at a *post-mortem*. There is a rapidly-advancing adynamy which, quickly following the first initial symptoms, causes the case to look serious; and too often soon renders the prognosis hopeless. The progress of these cases is swift, and a fatal issue is but rarely averted. It is the rapid progress that gives to blood-poisoning an aspect so grim, and which distinguishes it from pyæmia—at least, as pyæmia usually manifests itself.

There is much difference of opinion as to the nature of the infecting poison. To put the matter broadly: the poison is either a decomposing particle wafted from the putrefying material of one organism away to some surface on another organism previously healthy, in which it sets up oxidizing processes such as it itself is undergoing: or there is some lowly form of life, bacterial or other, which breeds in putrefying fluids, and which sets up putrefaction in other fluids if they gain access to them.

The strongest clinical evidence of the existence of such poison is furnished by the wards of hospitals where a gangrene in one patient will cause the wounds of other patients to assume a gangrenous character; or where pyæmia has located itself and seizes remorselessly every patient who is placed in the death-stricken chamber. In the disease known as charbon, or malignant pustule, the slightest contact of the fluids of a diseased animal with the fluids of another animal, previously healthy, will cause that animal to be affected in turn. These blood-poisons are apt to produce rapid suppuration in the great intermuscular planes of areolar tissue, or very destructive suppuration in the interior of viscera; the first is known as phlegmonous erysipelas, the latter as the pyæmic abscess. But still the changes in the solids of the body are far from being so constant as the changes in the blood. Necræmia, or death beginning with the blood, are terms given to those fatal cases in which the chief and most remarkable change is exhibited by the blood. In typhoid fevers and others of the malignant or pestilential kind, none of the solids of the body constantly exhibit such an early change of function or of structures as would warrant us in tracing disease and death to them. It is true that the functions of many solids are impaired—the muscular and nervous systems, secretion, digestion, assimilation, and nutrition, all suffer, but the very universality of the affection seems itself to point to some cause more general than can be found in any individual function; and such a cause may be found in the blood. The blood at an early period of these diseases, when they occur in their worst form, exhibits changes which show that disorder begins with it, and this disorder may reach to a fatal degree. The appearance of petechiæ and vibices on the external surface, the occurrence of more extensive hæmorrhages in internal parts, the general

fluidity of the blood, and frequently its unusually dark or otherwise altered aspect, its poisonous properties as exhibited in its deleterious operation on other animals, and its proneness to pass into decomposition, point out the blood as the first seat of disorder, and by the failure of its natural properties and functions as the vivifier of all structure and function, it is plainly the medium by which death begins in the body. How far the change in the blood is in its structure and vital properties, or in its chemical composition, further research alone can determine; the vivifying function of the blood depends on all these combined, and it is this function which obviously fails. Hence the complete adynamia, or general prostration, of all living powers, which occurs when this cause of death is most powerful. The blood, the natural source of life to the whole body, is itself dead, and spreads death instead of life. Almost simultaneously, the heart loses its power, the pulse becoming very weak, frequent, and unsteady; the vessels lose their tone, especially the capillaries of the most vascular organs, and congestions occur to a great amount; the brain becomes inactive, and stupor ensues; the medulla is torpid, and the powers of respiration and excretion are imperfect; voluntary motion is almost suspended; secretions fail; molecular nutrition ceases; and, at a rate much more early than in other modes of death, molecular death follows close on somatic death—that is, structures die and begin to run into decomposition as soon as the pulse and breath have ceased; nay, a partial change of this kind may even precede the death of the whole body; and the fœtid aphthous patches in the throat, the offensive colliquative diarrhœa of persons in the last stage of various fatal diseases; parts running into gangrene, as in the carbuncle of plague, the sphacelous throat of malignant scarlatina, and the sloughy sores of the worst form of typhus, and in the large intestines in dysentery, and the putrid odour exhaled even before death by the bodies of those who are the victims of similar pestilential diseases—are so many proofs of the early triumph of dead over vital chemistry.

Such is the course of blood-poisoning in its worst and most rapidly fatal forms. At other times there may be but a sharp fever with depraved excretions followed by recovery. It may result from extreme saturation with scarlatinal poison, and so

spring from what under other circumstances is but a simple exanthem, causing in its mildest form a slight fever for a couple of days. We can scarcely yet say that the effect is but the result of the amount of the poison; though there is much to favour such view. What the nature of the poison is in various zymotic diseases and blood-poisons we do not yet know, but many advances are being made which in a few years will give us, in all probability, certain and definite information.

§ 81. Most "blood-poisons" are diseases of more or less established bacteriology. The chief local or general diseases due to pyococi are septicæmia and pyæmia, erysipelas, infective endocarditis, puerperal septic disease, carbuncle and boils and gonorrhœa.

Under the general head of septicæmia and pyæmia we include three perfectly distinct constitutional affections. These are (1) Sapræmia, or septic or putrid poisoning, (2) Septicæmia, or septic infection, and (3) Pyæmia. Some authorities would also include in this list Chronic Pyæmia, but it is better to designate this affection by the name of "Multiple Abscesses." All these diseases are due to the entrance into the general system either of micro-organisms or of their products, and as a rule they are met with in some wound or breach of surface, the discharges from which have become contaminated with bacteria. Sapræmia is a general constitutional disorder exclusively due to chemical poisoning by the products of bacteria, and not to the entrance of the bacteria themselves, into the blood. The poison so introduced cannot increase in the system except by the absorption of fresh doses, hence the disease is in no sense an infective one. This condition is likely to occur when after parturition or abortion portions of placenta, membranes, or blood-clot retained in the uterus are infected with putrefactive organisms. The symptoms usually begin suddenly, and appear within twenty-four hours of the time the discharges from the wound were noticed to be putrid. The temperature rises abruptly to 103° F., and is often accompanied by a rigor. The wound may show signs of inflammatory disturbance, and may even appear gangrenous, and in every case there is a considerable quantity of very foul-smelling discharge. Roughly speaking, the difference between sapræmia, septicæmia, and pyæmia is this, that in sapræmia we have poisoning with the chemical

products; in septicæmia we have a true blood disease, the organisms growing in the blood; and in pyæmia we have in addition to blood-disease the formation of secondary abscesses. There is one great and practical distinction between sapræmia and septicæmia. In the former, washing out the decomposing products from the wound, or removal of the part which is the seat of decomposition, at once arrests the disease; but in the latter the manufactory of the poisonous products being not necessarily in the wound itself, such simple methods of treatment may exert very little beneficial effect. In cases of pyæmia proper the general symptoms are due to poisoning with the products of certain pyogenetic bacteria, and the abscesses to plugging of the blood-vessels with masses of these bacteria, or with emboli infected with them. The distinctions between sapræmia, septicæmia, and pyæmia have been admirably laid down by Mr. Watson Cheyne.

Infective endocarditis or ulcerative endocarditis is a disease due to micro-organisms, but it is not produced by one specific microbe only, but by a number of organisms acting either separately or conjointly. It seems that these bodies attack most readily valves which have been weakened or altered by disease. They are met with most commonly in people suffering from nervous depression as the result of alcoholism, dysentery, malaria, acute rheumatic arthritis, and other debilitating conditions. The microbes may obtain an entrance into the system by the skin and subcutaneous tissue, by the mucous membrane of the digestive tract, by the respiratory tract, and even by the genito-urinary organs.

Puerperal septic disease was at one time the scourge of obstetric practice. The enormous mortality which formerly prevailed in Lying-in Institutions was a disgrace to humanity. At one time puerperal conditions were so prevalent in these establishments that nearly all the patients died. The disease was directly conveyed to the patient by hands and instruments contaminated by decomposing animal matter. Although there has been a great improvement in such matters in hospital practice, it is stated that there has been no corresponding improvement in the general puerperal mortality of private practice. It would seem that it takes a very long time for

the paramount importance of the details of antiseptic midwifery to be generally appreciated and understood. There is good clinical evidence to show that a form of puerperal disease not distinguishable from septicæmia may arise from the conveyance of the poison of such zymotic diseases as scarlet fever or erysipelas.

Boils and carbuncles are, as regards etiology and pathology, identical, but they differ in their clinical aspects. A boil or furuncle has one suppurating focus which results in the formation of a single orifice, whilst a carbuncle consists of a number of furuncles grouped together upon a larger area, so as to give rise to a flattened rather than a conical elevation. In the case of the carbuncle there are usually several orifices, or there is sloughing of a large portion of the skin. The boils of football-players have been traced to the chafing of jerseys infested with pyogenetic cocci.

The gonococcus or micrococcus of gonorrhœa is constantly present in the exudation of that disease, and can be cultivated without difficulty.

In connection with this subject it may be as well to call attention to the subject of the serum diagnosis of enteric fever. It has been found by Widal of Paris, Dr. Albert S. Grünbaum and Dr. Gossage, that when the serum separated from the blood of a patient suffering from an attack of typhoid fever is mixed with a dilute emulsion of living typhoid organisms, there is almost immediately in drop cultures under the microscope, or within a few hours, when considerable quantities of the serum and of the typhoid bacillus emulsion are used, a peculiar change in these living organisms, the actively moving bacilli become distinctly less motile. They appear even to undergo change in shape, becoming shorter and thicker, whilst—and this is the most noticeable feature of all—they acquire a peculiar property of "agglutination"—that is, they run together, and become agglomerated into little "clumps," which at once become evident under the microscope, and in test-tubes or small settling pipettes, so fall to the bottom that they leave the supernatant fluid perfectly clear. It is said that this action is "specific" in its character, and that when typhoid fever is to be diagnosed by means of this action of the patient's

serum, the specific effect can only be obtained with the specific typhoid bacillus, whilst the serum from an individual who has not suffered from typhoid fever exerts no such influence on the bacillus. When the changes that take place in the serum of animals which undergo attacks of certain specific diseases were first studied, it was thought that much or most of the benefit to be derived from such study would be in the acquisition of improved methods of treatment. In certain diseases these anticipations have been more than realized, as in the case of diphtheria. The treatment on these lines of cholera and typhoid fever has advanced beyond the purely experimental stage. It has been found that serum obtained from animals so treated has acquired the specific characteristics met with in the blood of patients who are passing through, or have recovered from, an attack of one or other of these diseases.

Until a comparatively recent period all putrid and adynamic fevers were treated with wine, bark, and carbonate of ammonium, given in no stinted quantities. In this there is nothing of a specific character unless it be the quinine in the bark—as the experiments of Binz, of Bonn, as to the effect of quinine upon bacteria would tend to suggest. The plan, however, is not ill-grounded, and may be pursued with advantage in many cases. Then came the use of chlorate of potassium in septic conditions. It was found that the administration of this agent was commonly followed by the disappearance of the fœtor which marks a depraved condition of the fluids of the body; and the case passed from that of a septic form of disease to that of an ordinary pyretic affection. In more marked cases the effect was not so pronounced, and only a modification, amounting to degree, was the result. Chlorate of potassium is best given along with lemon-juice in the following form:—Chlorate of potassium ℥ss., the juice of two large lemons, to a wine-bottleful of water (Oiss), forming a palatable beverage, which can be taken at the rate of a wine-glassful three or four times a day. It forms a useful measure in ordinary exanthems, especially scarlatina; and is an excellent prophylactic for those in attendance on scarlatinal and other patients. Combined with the muriate of iron, chlorate of potassium is an excellent remedy in diphtheria, in severe cases of scarlatina with pronounced throat

symptoms, and in all forms of fever assuming a distinctly septic aspect.

More recently the idea has arisen of directly neutralizing the septic material in the blood, by the administration of large doses of the sulphites or of the sulpho-carbolates; but this method, although admirable on theoretical grounds, has not proved a success in practice.

To prevent the occurrence of puerperal septic disease every case of midwifery should be conducted with strict antiseptic precautions. As a rule only one antiseptic should be used at a time, for it not unfrequently happens that when an antiseptic is brought in contact with another antiseptic, or even with certain lubricants, chemical decomposition takes place. The most popular of all antiseptics is perchloride of mercury, and there is none which has proved more efficacious. For disinfecting the hands, a 1 in 1000 solution should be employed, whilst for the douche given before and immediately after labour, 1 in 2000 is the right strength. For practical purposes a 1 in 50 solution should be prepared, which corresponds in strength to pure phenol, and requires dilution to the same extent. The following is Dr. Boxall's solution :—

Hydrarg. Perchlor. ℥i.
Acid. Hydrochlor. Dil. ℥ss.
Infus. Rosæ,
Glycerine, aa qs.
Aquam, ad ℨvi.

S. "The Corrosive Sublimate Solution." POISON.

"One ounce of this solution added to one pint of water makes a 1 in 1000 solution."

The douche should never be of greater strength than 1 in 2000. Dr. Fancourt Barnes points out that an injection of corrosive sublimate, especially an inter-uterine injection, should always be followed by a washing out with some non-toxic fluid, a boric solution for instance, destined to draw away everything remaining of the sublimate in the genital organs. Under these conditions mercurial absorption following injection cannot take place.

Specific Poisons.

§ 82. Under this heading may be properly placed first a class of ailments with which we are but slightly acquainted in England, nowadays, at least. Here there is a specific poison, known as malarial poison, which institutes a certain set of marked and characteristic symptoms. Under the name of intermittent fever, or "fever and ague," as it is popularly termed, or in more marked cases "remittent fever," we have a recurrent disease of a peculiar character. During the interval all appears more or less well, even in the quickly recurrent form of quotidian ague. Then comes on an algide stage, accompanied by severe shivering, and a temporary enlargement of the spleen with contracted arteries, passing into sharp pyrexia, also lasting for a brief period. Malarial fevers are produced by a hæmatozoön, of which there exist several varieties, or probably even distinct species. Within the body the parasite seeks shelter in the red corpuscles of the blood, and there proceeds to sporulate, or to the formation of a crescent-shaped body. Development by sporulation advances at the expense of the corpuscle, and the naked spores are set free in the blood. Soon becoming adherent to a fresh corpuscle, they sink into its substance, there to undergo a further and similar cycle of development. The changes which take place in the spleen are due to an increased vascularity, in connection with which there is an inclusion by the cells of the pulp of the corpuscles which are degenerating owing to the parasites, and there is left behind much pigment. This increased vascularity may cause only a temporary swelling of the spleen, and the organ afterwards subsides. The more permanent enlargement, as Mr. Walter Spencer has pointed out, is due to an increased connective tissue formation whether specially of the follicles or diffusely of the pulp. Infarcts also occur. The stopping function of the spleen may be so far successful that the patient ceases to suffer from malaria. Presumably in such a case the spleen has taken a prominent part in removing the parasites from the circulation. The spleen may not, however, subside after the cessation of the malaria, but remain an abdominal

tumour, obstructing by its large size the abdominal circulation, and being in danger of causing at any time intra-peritoneal hæmorrhage either by the rupture of the tumour itself from some slight injury or often adhesions which have formed between the capsule and neighbouring structures. Such patients remain thin and anæmic, and an improvement in health may follow on splenectomy, always provided that the malaria has subsided and there is no leucocythæmia present. The improvement may be due simply to the removal of an abdominal tumour forming a mass of diseased tissue.

In remittent fever the intermission is brief, and a high pyrexia is almost constantly present. In other cases, as the returned East Indian, for instance, the sufferer will know but little of his malady, except at long intervals, when he will experience short attacks of the familiar fever. At other times periodical attacks of neuralgia will take the place of the febrile accession, and the intimate connection of the two is shown by their amenability to the same remedial agent.

At other times instead of an attack of fever, an attack of dysentery is the consequence of malarial poisoning. It is distinguished from the dysentery of armies and camps by its symptoms, which are those characteristic of malarial fevers, by its coming on under circumstances which ordinarily produce malarial fevers. It is found, too, that quinine is much more effective in malarial dysentery than is ipecacuanha. The diagnosis of these ailments cannot be considered here; they are known to depend upon a poison which is produced in swamps, fens, marshes, jungles, &c., and at Hong Kong from disintegrating granite. What the poison is, is yet unknown. Whatever it be, it possesses certain peculiarities. It is most powerful at night; it is the more certain the nearer the ground the person is at night; a circle of pines forms a great protection, while the blue gum-tree, the *Eucalyptus globulus*, is even still more effective; immersion completely under water will arrest the poison-producing properties of a marsh; while in more solid fens drainage destroys the malarial miasm.

The pathological sequences of malarial poison are found in the portal circulation and its viscera. Casorati thinks the stomach presents the most marked evidences of morbid changes.

Usually there is hyperæmia, and in the notorious Walcheren expedition there were also circular ulcers in that viscus. The liver and spleen are also affected; the latter is especially involved. During the cold stage of ague the spleen enlarges and contracts again when the paroxysm is over; while as the case becomes chronic the spleen permanently enlarges, and is known as "ague-cake." The liver is similarly affected, and is congested and enlarged. At the same time there is increased cell-formation as well as vascular congestion in these viscera. A black pigment is commonly found in the spleen, liver, and kidneys of those persons who have long been resident in malarial regions.

Lussana has given it as his opinion that the poison of malarial fever is confined to the portal circulation. This, if true, is no unimportant matter from a therapeutic point of view. It is well known that in many regions where quinine is not procurable the treatment of malarial fever has chiefly consisted of emetics and aperients. In some cases where quinine appears powerless, the administration of an emetic each morning sometimes brings the disease at once under the control of quinine. In many cases the administration of an emetic at the commencement of the paroxysm, or just before it is expected, is a very useful measure in the treatment of malarial fever. The old empirical treatment in the English Fens was first an emetic, then a sharp purge, followed by quinine and arsenic, and it may be questioned if any improvement can be made on this plan.

§ 83. In the different manifestations of malarial poison our great remedy at the present day is undoubtedly quinine. Perhaps, indeed, the confidence in quinine is rather too pronounced, as in many patients there is a marked intolerance of this agent. Especially is this last the case in patients from the tropics. In such patients arsenic, strychnine, and bebeerine, may be resorted to in lieu of quinine. Arsenic has been long in use in the East for the treatment of ague; but its utility was best seen in the French army under Napoleon, when the mastery of the seas by England cut France off from quinine altogether. In persons who are the subjects of malarial poisoning there is a marked tolerance of arsenic; and it requires to be given here

in much larger doses than when it is used as an alterative. It is also desirable to continue its use for some time after the fever: just as is the case with quinine. The other remedies, of course, are given in their usual doses. They are uncertain, but may be useful when quinine disagrees or has failed.

As to quinine, the evidence is overwhelming in its favour. In fever-stricken districts quinine rises in price in proportion to the supply of the remedy and the severity of the malarial outbreak. This association is the more marked now that quinine is given in doses of from half a drachm to a drachm; the more ordinary dose being from ten to twenty grains. Thirty grains per diem, in three doses, is the ordinary plan of giving it: taking care that one dose be given a couple of hours or so before the paroxysm is expected. By such means the paroxysm is delayed and diminished. Sometimes the arrest is very distinct, amounting to so much each day, enabling the delayed advent of the paroxysm to be closely calculated. Quinine is best given in ague in an acid solution.

Quin. Sulph. gr. x.
Acid. Sulph. Dil. ℥x.
Syr. Aurant. ℥ii.
Aq. ad ℥i.

forms an agreeable dose three times a day. The addition of ten minims of the tincture of gelsemium to each dose of the quinine mixture will be found a useful adjunct. When the case has passed from an acute to a chronic form, it is not necessary to continue the quinine in such large doses; though when an agueish attack is felt to be coming on in a patient familiar with it, ten grains of quinine will often arrest the threatening paroxysm.

When the pyretic attack is very marked, as in those cases where the fever is termed remittent, the ordinary measures for reducing body-heat, such as ice and cold affusions, may usefully be resorted to. At the same time the congested condition of the viscera of the portal circulation must be remembered, and purgatives must be given along with the quinine. But the administration of quinine must not wait upon the other measures—they are but the auxiliaries of the quinine. Maclean

advocates the administration of quinine by enemata in cases where there is much gastric irritability with vomiting. The subcutaneous injection of quinine is often very serviceable.

A very useful measure in severe cases of malarial fever is the preparation known as Warburg's Tincture. Among its other properties it is perhaps the most powerful sudorific with which we are acquainted, with the exception of jaborandi. It is especially indicated in those cases where there is intolerance of quinine. It is well to commence its administration by opening the bowels pretty effectually.

In malarious dysentery quinine must be combined with the ipecacuanha treatment; in fact it may with advantage be pushed to cinchonism ere the commencement of the ipecacuanha treatment. The treatment of dysentery by large doses of ipecacuanha was introduced, or rather reintroduced, by Dr. Docker, and has proved a great boon in India. Usually a dose of two grains of opium, or from half a drachm to a drachm of tinctura opii, is given in the morning; and then in about two hours afterwards, when the patient is pretty well under its influence, a drachm of powdered ipecacuanha is given in mucilage. No other fluid should be allowed. The opium tends to hold in check the vomiting induced by the ipecacuanha. The treatment is not pleasant, but it is effective. Next day the stools are of normal character, and the patient is much better.

In the treatment of the malarious cachexia, which forms such a terrible outcome of acute malarious disease, large doses of ipecacuanha are most serviceable where there is dysentery in a chronic form. The patient is kept in bed a day, and is fed with milk solely. Next morning a drachm of ipecacuanha powder is given in twelve pills, each containing five grains made up with mucilage. For a couple of hours before giving the medicine the patient is told to keep as still as possible lying on his back. Then the pills are given with the least possible disturbance and without any fluid, unless a sip of water be imperative; but the less the better. The patient is encouraged to resist the inclination to vomit, and usually can do so for a sufficiently long time to secure the effects of the ipecacuanha. Since the introduction of these large doses of ipecacuanha the number of broken-down dysenteric invalids in

India has been very notably reduced. When the bowels are steadied by this treatment, quinine in combination with iron may be systematically followed out for some considerable time.

It is highly desirable that such patients be also sent away from malarious to healthy districts. They must also be careful about their food and drink. Pure water, pure air, nutritious food, especially milk, are all indicated as important matters. The clothing should be warm and abundant, especially in cold climates. By these measures combined, a fairly comfortable existence can be secured instead of the miserable condition which obtained of old, where death formed a happy release.

As "brow ague," a form of malarial disease is far from uncommon in England. Not unfrequently it is regarded as congestive headache, and treated by blisters, evacuants, &c., without any good effect resulting. It can, however, be recognized by its regular recurrence at or about the same hour every day. Full doses of quinine speedily give relief. In frontal headache the young practitioner should always be on his guard as to the possibility of its being "brow ague"; and by his recognition or non-recognition of it he may seize or lose a good opportunity for displaying his knowledge. Its true treatment is that applicable to the other form of malarial mischief.

§ 84. *Cholera.*—This is a matter of no slight difficulty to treat of from any point of view. It is surrounded indeed by difficulties, and has been written about *ad nauseam.* It has been regarded as an evacuation to be arrested by lead and opium, &c. Another view has been to regard the choleraic discharges as an eliminative process, and to encourage them by castor-oil.

Cholera is due to the presence of a germ, Koch's comma bacillus, the growth of which is favoured by alkaline fluids, and checked by acids. If the germ is deposited in a place where the sanitary conditions are good—that is, where the conditions are unfavourable to its growth—it either dies or grows with difficulty. If, on the other hand, it is deposited in a place where the sanitary conditions are bad, it flourishes vigorously. If the germs in a weak or feeble condition, or in a state of dilution, are swallowed by a person in robust health, they may be destroyed by the acid juices of the stomach, but if the person is in poor health,

or weakened by living in conditions unfavourable for the maintenance of health, the germs escape destruction in the stomach, and pass into the bowels, the alkaline secretions of which favour their development, the result being that the patient contracts cholera.

Cholera is not contagious in the ordinary sense of the word, *i. e.* in the sense in which measles, scarlatina, and whooping-cough are contagious. In England there is almost no risk of its spreading to those in attendance on the sick. Nurses do not contract it if they observe scrupulous cleanliness, and are careful not to drink the milk or water or eat the food which has been standing in the sick-room. Cholera, however, has a special contagiousness of its own. It is introduced into the system by contaminated water, by milk diluted with water containing cholera excrement, and by contaminated food. We eat cholera and drink cholera, but do not catch it. The poison which produces cholera is contained in the excrements of those suffering from the disease. If by any chance, such as leakage from pipes, soakage from cesspools or drains, or carelessness in dealing with slops, any particle of this poison finds its way into wells or cisterns, or rivers from which the drinking-water supply is drawn, it is propagated with marvellous rapidity, and conveys its infectiousness to enormous quantities of water, spreading the disease far and wide.

With regard to treatment, the best plan is to give the patient three drops of the saturated solution of camphor on crumb of bread, and repeat the dose every ten minutes for an hour. In addition the patient should drink slowly half a tumblerful of cold boiled milk containing an ounce of brandy. If, at the expiration of an hour, there should be no improvement, give twenty drops of laudanum, twenty drops of dilute sulphuric acid, and three grains of acetate of lead in a wine-glass of water, and repeat it in three hours. This should not be given immediately after milk, or it will curdle it. In the absence of other remedies, twenty drops of chlorodyne will be found useful. If there is much depression, a tablespoonful and a half of good old brandy may be given in a little hot water every twenty-four hours.

Articles, such as sheets and pocket-handkerchiefs, which have

been used by the patient, should be disinfected before being sent to the wash. The disinfecting solution recommended for this purpose by the Local Government Board is made by mixing half an ounce of corrosive sublimate, one fluid ounce of hydrochloric acid, and five grains of commercial aniline blue in three gallons (a bucketful) of water. It is cheap, and in time of danger should be made on a large scale and distributed gratuitously, earthenware jars or wooden tubs and buckets being used for the purpose. Articles after being allowed to stand for some time in this mixture should be rinsed in clear water for three or four hours before being washed. Cholera clothes, sheets, &c., should be washed separately, and must not be sent to the wash with the household linen. The antiseptic solution may be used for washing floors, and generally for spreading about the house. For passages, water-closets, &c., sawdust saturated with a 1 to 40 solution of carbolic acid is useful.

For the protection of those who have been exposed to the contagion of cholera, Haffkine's anticholeraic vaccination will be found useful. In Calcutta the mortality among the inoculated is seventeen times less, and the influence of cholera nineteen times less than among the non-inoculated.

Nurses and others in attendance on cholera patients should wear caps, and long white aprons reaching from the chin to the feet. They should avoid going on duty when fasting, or whilst in a depressed condition of health or spirits. They should take nothing to eat or drink in the sick-room. They should be well fed, and they should have an extra allowance of wine. They should have nine hours' sleep in their own rooms, and should be made to take exercise in the fresh air daily. Any nurse who exhibits signs of nervousness, or who is unduly anxious about the patient, should be suspended from duty. For washing her hands and face the nurse should be supplied with 1 in 1000 solution of corrosive sublimate, which should not be kept in the sick-room, and should be labelled " Poison."

When cholera is epidemic the greatest cleanliness should be observed. The house should be thoroughly cleaned from top to bottom. Old furniture, dusty cupboards, dirty beds, and everything capable of harbouring dirt should be cleaned, and then exposed to a current of fresh air. Woodwork and floors

should be washed with soap and carbolic acid, and when dry painted or varnished. Carpets should be taken up, ceilings should be whitewashed, and walls and fences round the house should receive attention. Dust which may have accumulated under the roof should be removed. Pressure should be brought to bear on the poorer neighbours to induce them to adopt similar measures, and, when necessary, assistance should be given. In towns, courts, and alleys, and in the country, labourers' cottages require special attention.

In country districts when the earth about the house is sodden or contaminated with sewage, it should be dug up and removed, after being mixed in successive layers with sulphate of iron (green copperas). The substance is inexpensive, and when the crystals are heated in an oven they crumble to powder, forming a valuable antiseptic. It should be bought by the hundredweight and distributed to the poor. When disinfectants are not procurable, a fire should be made on the spot for the destruction of all rubbish and refuse, and the ashes dug into the earth, sand or gravel being spread on the top.

§ 85. In addition to these products of eastern and tropical climates we have certain other specific poisons which do not belong to any special areas, but which are scattered over the face of the globe. Those with which we are most familiar are enteric fever, typhus, relapsing fever, and the various exanthemata. The aid given by physiology and pathology to therapeutics in these affections is very great; but it is not towards the treatment of any one of the group, so much as to the general question of the management of the rise of body-temperature. The various means by which such rise may be brought about, and the different measures by which it may be reduced, have been given at length in Chapter IV., and what is said there will apply to every specific pyretic affection—not being malarial. The general line of treatment is to give mineral acids at frequent intervals.

℞ Acid. Hydrochlor. Dil. ♏x.
Syr. Aurant. ℥ii.
Aq. ad ℥i.

every four or six hours is a good form of fever mixture. The

use of acids, or sour wines, or of chlorate of potash with lemon-juice, or sulphites of soda, has taken the place of the old fever mixtures—such as acetate of ammonia with hyoscyamus—with advantage. As long as there are no complications, to render the treatment complex, such management may be continued throughout the case. In such complications as diarrhœa, melæna, or a purpuric state of the cutaneous rash, astringents are indicated. In the form of from fifteen to thirty drops of aromatic sulphuric acid, or of a fluid ounce of infusion of hæmatoxylin (in some cases they may well be combined), or of gallic acid or tannin, five to ten grains each, astringents are useful and may be administered at frequent intervals. When a typhoid condition threatens, the different measures indicated in the consideration of that state must be exhibited—no matter what the specific ailment with which it is associated. In all ordinary febrile conditions the general rules are to secure good ventilation, efficient nursing, a suitable dietary, a watchful and observant medical attention, ever on the outlook; rather than therapeutic rules of thumb. All these various matters have been described before, and need not be repeated here.

§ 86. There are some points which deserve special attention, such as the prevention of pitting in small-pox. A solution of nitrate of silver, a drachm to the ounce of water, is useful, and the surface may be washed with it in preference to Velpeau's plan of touching each vesicle with a point of the solid nitrate, on the third or fourth day of appearance. A mercurial plaster, consisting of mercurial ointment twenty-five parts, yellow wax ten parts, and black pitch six parts, is useful in semi-confluent cases. The plan of dissolving gutta-percha in chloroform and putting a coating of the solution over the face has not been found to answer. Cold cream, oxide of zinc, and dermatol combined form a good application. Collodion has its advocates, while others rely upon a darkened room to prevent pitting, as the pits are most prominent where the parts are exposed to light. Others cause a light blister to be applied to parts not usually seen, in order to direct the eruptive explosions to these points, and so draw them away from the face.

In scarlet fever the throat requires careful attention. With some practitioners it is the rule to give borax in honey, which

comes in contact with the ulcerated throat as it dissolves and is swallowed. Others prefer to swab the surface with nitrate of silver solution, half a drachm or a drachm to the ounce of water. Others prefer chlorate of potassium. In the treatment of severe anginose scarlatina the following combination gives most satisfactory results :—

Pot. Chlorat. gr. x.
Tinct. Fer. Perchlor. ℥v.
Syr. Zingib. ℥i.
Aq. ad ℥ss. o. 6tâ aut 4tâ horâ.

This is for a child from eight to ten years of age—the dose to be modified for those above and below that age. The addition of the iron gives better results than the chlorate of potassium without it. In scarlatina a cool room and free ventilation in warm weather is most desirable. Coolness is most grateful in the burning sensation of the coming out of the rash; but when desquamation has commenced, the skin, having thrown off an epidermal layer, is extremely sensitive to any change of temperature, and a chill readily results. Chilling is as disastrous, and is to be as watchfully guarded against at that time, as coolness, including sponging with cold water and vinegar, is grateful and beneficial when the rash is coming out, or being well established.

During peeling, it is well to have the body rubbed over with oil containing carbolic acid; this catches and detains the epidermal scales which would otherwise become detached, and, floating off into the air, become causes of infection; while the carbolic acid destroys the infecting power. This should be done daily after a warm bath.

In measles the great danger lies in the chest complications being overlooked, or not sufficiently attended to. There is in measles much tendency to inflammatory affection of the thoracic viscera; and warm poultices to the chest are as needful in measles as is a cool temperature in the early stages of scarlatina. In fact, in both these exanthemata it must ever be borne in mind that when the rash is either originally imperfectly developed, or is from any cause arrested, the internal complica-

tions are apt to become more pronounced; while at other times as the rash fades the internal affection is aggravated.

In both maladies, and especially in measles, there are after effects which must be carefully guarded against. These are most common in patients of a strumous diathesis, and are to be met by cod-liver oil, steel, good food, fresh air in the country, and better still at the seaside. If such measures be commenced in time many unpleasantnesses might be warded off which cannot be arrested if the measures are delayed until the absolute necessity for them become imperative. No writing will compensate for the lack of individual knowledge and thoughtfulness on the part of a medical man in the proper treatment of each case, according to its individual exigencies, in those who are emerging from an attack of measles or of scarlatina.

§ 87. *Diphtheria.*—This is an ailment which resembles the maladies described under the head of "blood-poisons" in many of its characters. There is a great tendency to sink by adynamy, and for a septic condition of the fluids to obtain.

Klebs, in 1883, described a special bacillus observed by him in diphtheritic membranes, and somewhat later Löffler separated it by growth in artificial media and produced distinct lesions in animals by means of inoculation. The bacillus is commonly spoken of as the Klebs-Löffler bacillus. Dr. Kanthack says:—"Bacteriology has taught us that we must alter our views and include under diphtheria many cases which, according to the older conception, would not have been called diphtheria. At the present time we frequently hear that typical bacilli have been discovered in cases which clinically are not diphtheria; our clinical notions must then be amended and our position reconsidered." The bacteriologist, like the chemical expert, is generally right, but he is sometimes a little too dogmatic, and is often apt to undervalue the importance of clinical experience. Bacteriology is a great help to the practical physician, but at the same time we do not treat our patients in test-tubes or in the bacteriological laboratory.

Most cases of diphtheria are now treated by means of serum. This substance was originally introduced by Behring in 1890, and favourable results have been obtained by Roux of Paris

and by numerous physicians all over the world. The injections are usually made deeply in the buttocks, or into the loose cellular tissue of the scapular or abdominal regions. The syringe should be sterilized by boiling, and the skin should be washed first with soap and water and then with some antiseptic. The dose of the serum employed varies with the strength of the preparation. Roux gave 20 cc. to 128 children without the production of the slightest inconvenience, and it is not uncommon to give 10 cc. twice daily for several days, especially in severe cases. The injection of anti-diphtheritic serum is often followed by a rash not unlike that of measles, the appearance of which may be delayed for many days. From Roux's statistics it would appear that the mortality from diphtheria has fallen from 51·71 per cent. to 24·5 per cent., showing a serum benefit of 27·21 per cent.

Beef-tea, milk, and alcoholic stimulants are clearly indicated in the treatment of diphtheria. Tracheotomy may be required, and is doubtless too often delayed. In the treatment of the after effects, iron, quinine, bitter beer, generous wine, are all desirable, especially where there is any tendency to paralysis. Diphtheria is not a markedly infectious disease, but if any of the membrane is expectorated and reaches a mucous surface, it will quickly spread and develop well-marked diphtheria.

§ 88. *Influenza.*—There is no doubt that influenza is contagious. Whether it is a disease of bacteriological origin is a point on which there may be some difference of opinion. Canon and Pfeiffer have both described an influenza bacillus, the home of which is said to be in the grey mucus of the respiratory tract. It is extremely minute and stains with difficulty. It is probable that the bacillus during its life and growth gives rise to the production of toxins, which, being carried into the circulation, give rise to the characteristic symptoms of the disease of the various sequelæ by which it is attended.

During the present century more than a dozen epidemics of influenza have been recorded. The epidemic which commenced in 1889 and spread over nearly the whole of the civilized world, claimed many hundreds of thousands of victims. The most frequent complications of an attack are pneumonia and pleurisy, the latter not infrequently resulting in an empyema.

With regard to treatment, it may be said at once that we know of no specific. The sooner the patient goes to bed and doses himself with port wine, the greater will be his chances of recovery. Some practitioners give the liquor ammoniæ acetatis, whilst others rely on quinine. When there is much pain in the limbs or joints, salicylate of sodium or salol often does good. Convalescence is often extremely slow, and it may be months before the effects of the attack are thoroughly shaken off. With regard to prophylaxis, the best thing is to keep out of the way of contagion.

§ 89. *Dengue, or Dandy Fever*, is a disease of tropical climates characterized by suddenness in the attack, a scarlet rash, with intense pains in the joints, simulating acute rheumatism. It occurs in remissions, and has been by some regarded as of a malarious nature. It does not, however, appear to be amenable to quinine like malaria in general. The method of treatment most approved of is to give emetics, and then purgatives, consisting of sulphate of magnesia and senna, with a little jalap. The free discharge of bile is followed by much relief to all the symptoms. When the attack is over, tonics, such as quinine, strychnine, and steel, are indicated.

As to the terrible tropical fever, "Yellow Jack," it does not appear that any light has been thrown upon it which gives therapeutic indications of any kind. The yellowness of skin has been ascribed to liver complications, but this has given no clue as to the treatment to be pursued. It is a curious fact that yellow fever never obtains beyond a certain latitude. If the fever-stricken ship can reach a certain latitude its crew are safe.

§ 90. *Pertussis, or Whooping-cough*, comes under the heading of specific poisons. It is an infectious complaint usually confined to the earlier years of life. It is characterized by disturbances of the respiratory nerves of a spasmodic character, and is a most troublesome affection. An emetic at bed-time often renders the cough less persistent in the night. Many remedies of an antispasmodic character have been tried, and of these bromide of potassium, or ammonium, in free doses is the best; but none are entirely satisfactory. Belladonna is an excellent remedy, but to do any good it must be given in doses

of ten minims of the tincture every four hours. Children take belladonna well—even better than adults—and there is not the slightest fear of its producing toxic symptoms. Drosera is an excellent remedy in small doses, and often gives prompt relief to the spasmodic cough. It answers better in summer than in winter—in other words it is more efficacious in simple whooping-cough than when the disease is complicated with bronchitis. When much emaciation is the consequence of the cough, leading to vomiting, the best thing to be done is to feed the child immediately after it has been sick, with milk, beef-tea, &c., so that the ingesta may be assimilated ere the next attack comes on. Perhaps this is the most important part of the treatment of whooping-cough. After the true ailment is over, usually lasting about three weeks, a convulsive cough often remains, the consequence of habit upon the different nerves implicated in the act of cough. Here quinine, steel, good food, and fresh air are indicated.

§ 91. *Erysipelas.*—This is an affection about which there is much confusion. True erysipelas is a well-marked form of pyretic disease characterized by much adynamy, and not rarely by distinct blood-poisoning. It is especially fatal to persons of broken-down constitution. It is usually found in the neck and head. In such erysipelas, tonics, stimulants, and half-drachm doses of the tincture of perchloride of iron every four hours, together with milk and nutritive food, form the best line of treatment. As external applications flour, oxide of zinc, and other powders, or cotton-wool, are useful; while some prefer warm solutions of lead and opium. The tendency is to death from asthenia; and if a typhoid state sets in the aspect of matters is very gloomy.

Erysipelas is a disease due to a streptococcus closely allied to if not identical with *streptococcus pyogenes.* It has been held that erysipelas can give rise by contagion to pyæmia, puerperal fever, and other septic diseases and *vice versâ;* but there is no sufficient evidence in favour of this view. The disease being contagious, the patient should be isolated as speedily as possible, and kept from all communication direct and indirect with people with open wounds, and especially from puerperal cases. The practitioner who is in attendance on a case of erysipelas

must for the time abandon midwifery practice. The diagnosis of erysipelas of the skin presents no difficulty. The characteristic point is the abrupt raised margin of redness spreading by direct extension, and accompanied by considerable constitutional disturbance. Erythema occurs in bright red diffuse patches, and spreads by the formation of fresh distinct patches. Eczema has a weeping surface, and never at any time a distinct raised margin. Diffuse cellulitis is accompanied by more brawny swelling, and the superjacent redness of the skin is more diffuse.

When phlegmonous erysipelas occurs it is a very serious affection. It is a dermatitis with rapid formation of pus in the subcutaneous areolar tissue, usually of the limbs and of the intermuscular planes. It is ordinarily causally connected with grave and fatal blood-poisoning; and when so occurring it requires all the stimulo-tonic measures and antiseptic treatment that are available: too often with no good results. At other times, when rather a localized disease than an expression of a general condition, recovery takes place; but only after long and terrible incisions made for the purpose of evacuating the different *dépôts* of pus which form so freely in this malady. Carbonate of ammonium, wine, steel, beef-tea, and milk are all requisite in unstinted quantities, in order to give the system a chance of tiding over the period of peril.

In connection with the subject of blood-poisoning it may be desirable to say a few words on the subject of ptomaines or cadaveric alkaloids. "They are supposed to be alkaloids generated during decay, and they closely resemble the vegetable alkaloids —veratrine, morphine, and codeine, for example—not only in chemical characters, but also in physiological properties. They are commonly produced in substances which after exposure have been excluded from the air—in buried corpses for example. Ptomaines are not of necessity of cadaveric origin. They are found in a number of putrefying substances, such as sausages and tinned foods. Ptomaines or bodies closely allied to them have been extracted from decomposing urine and from human saliva, but these in all probability are not toxic. From the urine of patients suffering from various diseases poisonous principles have been obtained. In the bodies of persons exhumed after dying of

acute arsenical poisoning, peculiar arsenical poisonous bases are found known as 'Arsines.' A common defence in cases of poisoning is that the reactions obtained were due to cadaveric alkaloids, and not to the poison administered" (Murrell, *What to do in Cases of Poisoning*). The method of preparing cadaverine and putrescine is described in Kantack and Drysdale's *Elementary Practical Bacteriology.*

CHAPTER X

ACUTE AND CHRONIC DISEASE

§ 92. THERE are many reasons why a chapter should be devoted to the peculiarities of acute and of chronic disease—contrasting with each other as they do—and to the consideration of their relations. We shall find that acute disease of a part may persist in a chronic form; we shall also find that chronic disease has a tendency to assume an active form, at certain times and under certain circumstances. From the consideration of these matters we shall be enabled to see how to so conduct acute disease as to reduce to a minimum the tendency for it to linger in a chronic form; and also how to treat chronic disease so as to obviate to a great extent the development of acute manifestations.

Acute disease is a brief affair, which, if survived, often leaves the system but little altered. For the most part it consists of acute inflammatory conditions or zymotic affections; but it is not confined to these two genera of disease; it may result from some brief passing condition, as shock, disturbed innervation, &c. The indications most manifest are such as point conclusively to the imperative necessity for tiding the patient over the dangers of the hour. In a few days the danger to life usually passes away; sometimes, however, not until the existence of the individual has been most gravely imperilled, and the question of a satisfactory convalescence has been made a complicated matter. In the phraseology of the past, our duty in acute disease is to obviate the tendency to death. In order to do so with anything like an approach to success, we must clearly distinguish the side upon which death is threatening. Having

recognized the nature of the most imminent danger, it then becomes practicable to select measures calculated to arrest, or modify the impending risk to life. At one time a patient may seem to be sinking from sheer pain. The condition is that of cold extremities, a small or failing pulse, of agonized features, and a general approach to collapse. The impression made by the painful sensations upon the nerve-centres is such that a condition not widely different from that of shock is induced. Indeed, there is little difference betwixt the condition produced by severe burns, inflammations of serous surfaces, not in other ways immediately dangerous to life, and that induced by tortures or punishments deliberately inflicted for any purpose. There is a certain amount of nausea involved in the pain which is apt to be fatal. It is that form of pain which follows when a cricket-ball strikes a batsman on the genitals, and which is quickly fatal when prolonged; as in the form of murder not uncommon in India, where the testicles are firmly grasped until the victim is dead. The pain would seem to arrest the action of the ganglia of the sympathetic, and first to cause syncope and then actual death. It is especially associated with affections of the viscera, and differs from the pain produced by neuralgia or affections of the limbs, especially those osteal affections which are very painful. It is perhaps in degree rather than in kind that these pains differ, for collapse is not rare under the punishment of the lash, and the severe agony produced by the torture of "the boot," as in the case of Macbriar in *Old Mortality*, so vividly sketched by the author of *Waverley*. In despite of the stern and unflinching heroism of the man, syncope followed a certain measure of torture. We are not yet in a position to know or to be able to estimate how far such syncope and unconsciousness may not be directly preservative when acute agony is present. Unconsciousness may be the only means of averting death, or it may be an approach to death—a difference of degree only. The reflex inhibitory fibres of the vagus are those which cause syncope under shock, injury, or emotion. Such syncope leads directly to unconsciousness, and by this the brain is saved from the full force of the shock: which if it fell upon a brain not anæsthetized by unconsciousness would do severe and serious injury. Syncope then saves

the brain from the full force of shocks, either material or emotional.

When fainting results from a brief temporary pain, as the extraction of a tooth, or the opening of an abscess, it may be safely left to itself. A few minutes in the recumbent posture is usually sufficient to restore consciousness. The pathology of syncope is this. The heart fails to propel the blood into the encephalic vessels, there is a state of acute cerebral anæmia induced, and failure of brain function follows, accompanied by loss of motion and of sensation. By the latter, relief from suffering is obtained. When the causation is but temporary, the effect is but brief, and the heart soon commences again to beat. As soon as the arterial blood once more courses through the brain, functional activity returns; this is much aided by the recumbent posture, which permits the blood to run through the head equally with other parts, instead of having to be lifted up by the ventricular contraction; as is necessary when the head forms the highest point of the organism. At other times, when the pain is less acute and more persisting, as in the passage of gall-stones, for instance, a condition is induced which is rather that of imperfect or partial shock; where unconsciousness is not reached. Such is the consequence of severe shock, which we are often called upon to relieve or treat. Our principles of treatment run as follows. In acute shock, or syncope, stimulants, the more rapidly acting and diffusible the better, are indicated. Sal-volatile, eau de Cologne, alcohol, or spirits of chloroform are all useful and serviceable The following combination is very frequently desirable:—

Ammon. Carb. gr. v.
Sp. Chloroform, ℥ ss.
Aq. ad ℥i.

It may be repeated. A teaspoonful of sal-volatile forms a pleasant stimulant in water. When the patient is unconscious the fumes of ammonia are very useful. One point, however, must be borne in mind in connection with the holding of a bottle of ammonia to the nostrils of a syncopal patient, and it is this,—the unconscious patient cannot turn away the nose from

the fumes, and if the bottle be held too persistently to the nostrils, inflammation of the air-passages may be caused.

When the condition is that of partial or imperfect shock, as in the condition which obtains in the passage of gall-stones, of calculi along a ureter, or inflammation of that great serous surface, the peritoneum, it is a matter of question how far stimulants are desirable. They will arouse the patient to a fuller and more vivid consciousness of his suffering; but this is itself undesirable. Under certain circumstances it may be necessary to rouse an individual out of lethargy, even if acuter comprehension of pain be the consequence, as in accidents, where the sufferers must be moved. Here stimulants may be indicated. When the patient can rest in bed and the pain is very severe, the more rational plan is to deaden the receptivity of the nerve-centres by full and repeated doses of opium.

Where violent pain exists, very large doses of opium are borne with impunity—the two being antagonistic in action. As soon as the pain is relieved, the opiate must be stopped, or much reduced in dose, else fatal consequences may follow.

§ 93. At other times death may threaten from hæmorrhage. The bleeding may be continuous, as in the oozing from persons of a hæmorrhagic diathesis; or it may be from some larger vascular trunk. Whenever it is practicable, pressure must be applied to the bleeding part, in accordance with rules laid down by the surgeon. Where pressure can be applied by ligature, tourniquet, or finger, arterial hæmorrhage can always be controlled. Sometimes the actual cautery may be indicated.

In other cases, such as hæmorrhage from viscera, far different means are alone feasible. They consist of astringents, and styptics, such as alum, perchloride of iron, zinc, acetate of lead, opium, and matico-leaf. These may be given internally, or, if the bleeding can be reached, applied locally. Cold is often of the greatest service in the treatment of severe hæmorrhage. It may be given by the mouth, injected by the rectum—in impassable urethral stricture, from congestion, packing the rectum with ice soon gives relief from its effect upon the blood-vessels—or applied locally, as to the right groin in the hæmorrhage of typhoid fever. At other times it may be necessary to resort to venesection, especially in hæmoptysis. In the well-known

case of George the Fourth, this was the only measure which arrested the hæmorrhage from the lungs. When bleeding is the result of high blood-pressure, venesection, or its equivalents, viz. bleeding the patient into his own vessels by vascular depressants, are the measures clearly indicated.

In hæmorrhage stimulants are undesirable. The syncope which checks the hæmorrhage is a condition of arrest, more or less complete, of the ventricular chambers, with low arterial tension. When a stimulant is given, and especially an alcoholic one, then the heart's action is restored, blood is pumped into the elastic arterial system and then the bleeding recommences. This goes on till syncope is again induced with arrest of the blood-flow. More stimulants are given, the pulse returns; and with it the hæmorrhage. This goes on until the system will no longer react to the stimulant, and so the organism is preserved; or if the stimulant treatment be persisted in, it may, and it is to be feared often does, result in fatal loss of blood. This last untoward result is attained when the persons around the patient are sufficiently wilful and ignorant—or frightened out of their wits, and so rendered murderous in their well-meant but unfortunate measures. When the young medical man is called in to such a state of matters he must be prepared to find his plan of intelligent withdrawal of stimulants meet with a stern and indignant reprobation from the alarmed friends. To see the poor patient pale, blanched, unconscious, and tossing his, or more often her, arms about, and to withhold stimulants; to leave the poor thing in a drenched bed, cold and chilled, and not only that, but often to apply ice or cold to the gelid creature, seems heartless and repulsive. Often indeed, in their sentimentalism, the affrighted friends would prefer a sympathetic meddlesomeness, even if the results are disastrous. It may be difficult to pursue a rational course under these circumstances, and, unmoved, to turn a deaf ear to the entreaties, but in the interest of the patient it must be done. In hæmoptysis, or hæmatemesis, ice may be supplied externally over the chest or to the epigastrium with advantage. Small chips of ice with astringents may be given —but cautiously. If the bleeding is in the stomach, any distension of it will be apt to dislodge the clot and start up

further hæmorrhage; if from the thorax, cold ingesta need not be so cautiously withheld, but vomiting must be avoided, as that might at once reinstitute the blood-flow. When the flow is from a hollow viscus, ice or cold water with astringents may be injected.

Plugging is only permissible in uterine hæmorrhage, and that too when the uterus is either unimpregnated or only at the early months of gestation; otherwise the internal hæmorrhage which results is dangerous and not rarely fatal.

Quiet and cold are the great requisites in the treatment of hæmorrhage. *Post-partum* hæmorrhage is, however, an exception to this rule. It has been found that injections of hot water into the uterus arrest the bleeding. The hot water throws the muscular fibres of the uterus into tetanic spasm. Teaspoonfuls of salt are a measure which may be resorted to when other remedies are not at hand, or are not available.

At other times there may be free discharges, usually from the bowels, which may threaten the existence of the individual. In such cases it often happens that the measures resorted to must be very vigorous. When diarrhœa is colliquative and profuse, the combination of stimulants and astringents with opium is clearly indicated; the first two in no measured quantities. The combinations in most use in such cases are the following:—

Ammon. Carb. gr. v.
Tinct. Opii, ℥x.
Inf. Hæmatoxyli, ℥i.

every three or four hours. At other times the combination of the logwood with acids is indicated:—

Æth. Sulph. ℥x.
Acid. Sulph. Arom. ℥xx.
Inf. Hæmatoxyli, ℥i.

with or without opium, may often be given with advantage. At other times acetate of lead with opium in pill may be given, especially when there is much tendency to vomiting, and the stomach rejects readily anything which distends it. The young

student will not give acetate of lead along with mineral acids, especially sulphuric acid, as the insoluble and inert sulphate of lead would be thus formed in the system; but will substitute sulphate of copper for the lead. Colliquative sweats often endanger life. They may be met by the measures given above, or by quinine and sulphuric acid, or again by the free use of phosphoric acid. Belladonna may be applied locally with advantage, as well as given by the mouth. Ten drops of the tincture three times a day, or oftener, will not uncommonly arrest or greatly diminish profuse perspiration; or, better still, atropine, from an eightieth to a fortieth of a grain in a pill at bed-time, is often very good. Oxide of zinc in two-grain doses at bed-time often checks colliquative sweating. It is commonly given along with hyoscyamus, which is not without a value of its own.

§ 94. At other times death threatens from impending stoppage of the heart or of respiration. When the action of the heart is failing, stimulants of any and every form are indicated. Failure of the circulation is one of the commonest causes of death in diseases of the respiratory organs. The obstruction offered to the flow of blood through the pulmonic circulation produces distension of the right heart; as the ventricular chamber becomes over-distended so its power wanes, and then exhaustion is imminent. In such cases there is a fast, compressible, and irregular pulse, becoming gradually intermittent, and after death the left ventricle is found small and contracted, while the right ventricle is distended and full of black blood. The administration of digitalis in these cases often averts a fatal result. The pulse just described is the measure of the condition of the right heart really, not of the left;—which keeps time with the right side and passes on the amount of blood which comes over to it. When digitalis is given here, the right heart contracts more powerfully upon its contents as it recovers from its over-distended condition; once more a fair amount of blood is passed over to the left heart, and the pulse becomes fuller; the right ventricle on recovering its normal size contracts less frequently, consequently the pulse is not so frequent; the arterial system becomes better filled with blood, and, correspondingly, the venous system is not so much

distended, and a general improvement results. Again and again will a fatal result be averted, when threatening from failure of the right side of the heart, if digitalis be given along with diffusible stimulants. Hot poultices to the chest, especially if dusted over with mustard or capsicum, will often aid in giving relief to this condition.

At other times death threatens from the side of asphyxia. Thus it occurs in pneumonia, especially when the space of lung remaining unaffected is insufficient for the purposes of respiration; or it is present in bronchitis when the air-tubes are filled with mucous secretion, and the chemical interchanges conducted in the lungs are becoming arrested. Under such circumstances a condition of the gravest peril is induced. The action of the skin may be called into play, and the compensating effects of exhalation from the cutaneous surface may be secured. If there be much accumulation of mucus in the air-passages, vomiting may be induced; and in the worst cases, when apparently the very effort of vomiting would seem enough to asphyxiate the exhausted patient, emesis is followed by such cleansing of the air-passages that a little sleep is secured, and the turning-point is safely passed. Especially is this true of children, and the young practitioner must never be deterred by fear from trying the effects of emetics in the bronchitis of children. They can do no harm, and often do much good. As an emetic, sulphate of zinc combined with ipecacuanha wine is a very efficacious remedy: much better, indeed, than either singly. If the case is very desperate, irritation of the fauces may be resorted to, and the finger is much better than a feather. Of the more special matters of diseases of the respiratory organs and of failing circulation, they will be discussed at length when the diseases of these systems are considered.

Death may, and often does, result from collapse, and oftener from an exceedingly high temperature.

§ 95. There is nothing with which, as medical men, we are more familiar than the fact that there are agents which possess what is termed stimulant properties, *i. e.* they produce a distinct effect in calling out more marked evidences of vital action. Under the influence of a stimulant the pulse rises in frequency, while its beats are more powerful; the extremities become

warmer, the cheek flushes, the eye brightens, the thoughts flow readily, and the hesitating tongue is loosened. Such are the ordinary phenomena of limited stimulation by alcohol. It is in watching the effect of alcohol that we are most familiar with the action of stimulants. Other stimulants, as ammonia, spirits of chloroform, æther and cannabis indica, produce like but not identical effects. Ammonia induces a slight increase in the force of the pulse, some excitement of the brain, and a general sensation of warmth. Being a stimulant to the heart, it is used in fainting and exhaustion. Ammonia is frequently administered as an antispasmodic—an action depending probably, in part, on its power to strengthen the heart's action, but, like all other antispasmodics, its influence is but brief. There is also a distinct rise in the force and frequency of the pulse after taking a dose of spirits of chloroform, or of æther.

In considering the action of stimulants there are two points that strike one strongly: they are (1) the effect upon the heart, and (2) the effect upon nerve-cells. How far the first effect depends upon the action of the stimulant upon the ganglia of the heart is not yet demonstrated; but at least it is probable. There is certainly an increase in the vigour and frequency of the contractions of the heart after the administration of a stimulant, and this may take its origin either in direct stimulation of the cardiac ganglia, or in some remote action upon the complex nerve-supplies to the heart. From the readiness with which stimulants act, the first seems the more probable. Certainly they do affect the heart, and powerfully, as is seen in their administration in fainting. In addition to this effect upon the heart there comes the action upon the cerebral cells. That the cerebral cells are influenced by stimulants is unquestionable; but whether this effect is produced by some direct effect upon the cells, or merely by an afflux of arterial blood, or both combined, is not yet quite settled. We know that the functional activity of the brain is in direct proportion to its blood-supply. In stimulation it is not yet ascertained whether it is an afflux of blood to the cerebral cells which heightens their activity, or there is a condition produced in the cell which induces it to attract more blood to itself. Probably both factors act. The

capacity to attract more blood would exercise but little effect if an increased supply of blood were not forthcoming in answer to the demand: while an increased blood-supply to a part would have but little effect if the tissues did not have an increased capacity to attract blood. In the case of alcohol it has been shown by Dogiel that along with increased action of the heart there is also dilatation of the carotid arteries, and, thus, an increased blood-supply to the brain. There is also increased functional activity of the brain. If the stimulation be considerable, a condition of intoxication is produced.

In intoxication we find several stages. The first effect of this increased blood-flow through the brain is to cause the brain to be more active. The thoughts flow rapidly, the halting speech loosens into eloquence; coldness of feeling gives way to affection, passion, or sentiment; despair becomes blended with hope, courage is reanimated; difficulties melt away, and the impracticable is almost realized. These are the sensations which have impelled men in every clime to devise some means of exalting the nervous life; and a fearful price is paid for it. Soon the ready speech grows muffled, the thoughts confused, the impressions blurred; the higher feelings become submerged under the rising animal impulses; hope becomes a disfiguring conceit, courage merges into recklessness and boasting, exhilaration into boisterousness, and sentiment into maudlin. At last the human frame lies unconscious, powerless; all is oblivion; the awakening is, however, a grim reality. At first there is increased functional activity of the brain, and at this stage there is an increased blood-supply to it. There is, too, every reason to believe, as said before, that the cerebral cells are themselves stimulated into increased activity while the afflux of arterial blood renders such activity feasible. After much activity of the cerebral cells there comes on exhaustion. At first the nerve actions cease to be perfectly co-ordinated, the action of different parts is no longer accurately adjusted, and the more complex movements, as talking and walking, are impaired. An effort of will can, however, supply what is wanting or defective in the ordinary automatic action, and the appearance of sobriety may be maintained by an effort: but this is only so long as a certain point is not passed. After that

all the most active cerebration then possible is insufficient to produce co-ordination; and then is exhibited the spectacle, far from uncommon, of an intoxicated person, conscious of the condition which obtains, making the most determined efforts to maintain an equilibrium or to walk steadily, without the desired result being obtained. A little further on and all volition is abolished; and the medulla oblongata is alone in action, carrying on the circulation and respiration. At the time that the manifestations of brain activity are beginning to flag, the carotids are found to contract—not to their normal calibre, but to something below it, to a calibre less than normal. There is less arterial blood passing to the brain than in its unstimulated condition. At the same time the peripheral vessels of the system generally are dilated, and so there may be a withdrawal of blood away from the brain, as well as a diminished demand for it on the part of the exhausted cerebral cells. But when the functional activity of the brain is flagging, pronounced intoxication by alcohol is present, the administration of ammonia will usually produce sobriety. That is, it will restore such a condition of brain as is compatible with comparatively sober action. When the cerebral cells are exhausted and the arterial blood-supply to the brain is impaired, and the venous radicles of the brain are probably full of blood, the administration of ammonia excites the cells into action, increases the supply of arterial blood, and with it the circulation through the brain, including the venous radicles, and so restores a condition of brain activity. That is, one stimulant will produce an effect when the nervous system has been exhausted by the action of another stimulant. A condition of exhaustion of the nervous centres having been artificially produced, then another stimulant is given which again rouses them into action. It must ever be borne in mind that conditions of exhaustion require doses of alcohol which under ordinary circumstances would produce a drunken state, in order to procure the desired stimulation. When exhausted the system will tolerate with only good effects doses of alcohol which would in unexhausted states produce advanced intoxication; and at critical times the amount required is far beyond what is ordinarily prescribed.

§ 96. There are one or two points to be further alluded to

in this account of the history of a fit of intoxication. One is the readiness with which intoxication is produced after long abstinence from food. Every one knows how swiftly the first stages of intoxication pass into the more advanced ones when there is no food in the stomach. Further, we are equally familiar with the fact of the power of a good dinner to endow a man with capacity to "carry" alcohol. It is well known that when a man who has long drunk hard, but with his assimilative powers unimpaired and appetite keen, begins to diminish the amount of food, that man "is giving way," as it is termed; or in other words, that his capacities are becoming impaired. To what does all this point? It indicates that when pabulum is freely offered to the cerebral cells during alcoholic stimulation they do not become exhausted readily—that the advanced stages of intoxication are not so easily reached. Especially is this the case when coffee and tea are taken amidst the alcohol. These agents act upon the vaso-motor centre and excite the heart into firmer contraction, while the peripheral vessels are induced to contract, or maintained in contraction, and so the blood-pressure in the arteries is increased and the blood-supply to the brain sustained. The whole of the arrangements of a dinner-party are so constructed as to enable the guests to take a maximum of alcohol with a minimum of risk of the earlier stages passing into the later stages of intoxication. In consequence of the abundant supplies of nutriment in the system, the tired nerve-cells are well nourished during the sleep which follows, and in the morning they are again ready for work. They may be played upon by alcohol with comparative immunity if they are well fed, and the effects of stimulation repaired by good supplies of nutrient material. In fasting, however, it must not be forgotten that alcohol is most quickly absorbed by the stomach.

If, however, the stimulation has gone on to the latter stages —whether to a greater or less extent it does not matter, it is a difference of degree merely—the effects are well demonstrated next day. The nervous system is unstrung, the hand is tremulous, the thoughts are erratic, the emotional condition is that of depression; the digestive powers are impaired, the secretions are scanty or depraved, and the capacity for labour of any kind is diminished. There is craving for fluids—the temperature is

generally high—and a desire to remain in bed, the consequence of the feeling of exhaustion. If it be absolutely necessary to get up and go about the duties of the day, further stimulation by alcohol is usually unavoidable. If this condition of excessive drinking at nights, followed by resort to alcohol early next day, is continued, a condition of systematic exhaustion, or approaching physiological bankruptcy is induced. The vital powers are so exhausted that what would otherwise be trivial demands upon the system become important; and what is termed the resistive power of the system is lowered. Slight acute attacks in such systems commonly lead to fatal results.

§ 97. Such are the consequences of chronic alcoholic indulgence, of persistent stimulation. They will enable us to comprehend all the more clearly the points to be attended to in the administration of stimulants when it becomes desirable to prescribe them medicinally. One of the first lessons taught is this: The stimulation must bear a distinct relation to the forces of the system on the one hand, and to the habits of the individual on the other. If the stimulation is out of proportion to the forces of the individual, stored up in a static form—the reserve fund of the system on which we subsist during enforced starvation—then exhaustion is directly induced; the strength is called out in useless displays of energy, and dissipated ere the hour of need arrives. This is very common in the over-stimulating present time. It is seen in the exhaustion produced, amidst the ignorant lower classes, in parturient women, whose energy is dissipated by draughts of alcohol during the first stages of labour; and then, when the second stage arrives, the strength that should have carried them through the active efforts then required is gone—having been wasted when useless and inoperative. This is equally obvious in the process of stimulation by alcohol and beef-tea in the early stages of acute disease, especially fevers, when an officious attendant dissipates the body reserve fund ere the hour of need has approached. When the time for resort to stimulants comes, the force the stimulant can, and otherwise would evoke, is wanting; and the patient sinks—slain by good intentions. If the reserve fund cannot be maintained by supplies of easily-assimilable food, to some extent at least, stimulation is exhausting, and should not be

resorted to prematurely, nor be unduly persisted in; the time may and often will come, when it may be simply "neck or nothing," when a point must be rounded at all risks. If the reserve fund has not been unduly drawn upon, success is often practicable; but if it has been already dissipated, then success is no longer feasible.

In the same way individuals who have rendered themselves physiologically bankrupt by chronic stimulation readily sink under the demands of acute disease. In such persons stimulants have to be given in enormous quantities to produce ordinary effects, and then, too, often without the desired results being attained. There is a close analogy betwixt the condition of these last-mentioned individuals and those whose stores of energy have been dissipated by stimulants in the early stages of acute disease.

§ 98. In attempting to fairly estimate the action of stimulants, and especially of alcohol, one point it is of the utmost importance to remember. It is this—alcohol is a food! If alcoholic stimulants were mere disengagers of static force, early exhaustion would be the rule. But as alcohol is a readily oxidizable form of hydro-carbon, it is also a food as well as a stimulant. In fact it is one of the most easily assimilable forms of food, and very frequently it can be taken and utilized when no other form of food is available. While it is a stimulant, an evoker of force, it also supplies to some extent that force in its readily oxidizable self. The experiments of the late Dr. Anstie and Dr. Dupré have placed beyond all question, or honest doubt, the fact of the oxidization of alcohol within the organism. If alcohol is oxidized in the body, then alcohol is a true food or furnisher of force. It is essential, in order that the organism should continue to exist, that it be continuously supplied with free oxygen and oxidizable substances. It is of great importance to have definite ideas on this head. In administering alcohol as a stimulant we also give a food; if it were not so we should often exhaust the patient whom we really conduct through a time of peril into the haven of convalescence. When other stimulants, as ammonia or æther, are given, we must remember that they are not foods; and their administration must be accompanied by food and alcohol.

Beef-tea is a useful stimulant, but it is only to a very slight extent a food. As ordinarily given, it is scarcely a food. It contains nothing out of which tissues may be built, for its products are too far advanced for histogenesis: while its oxidizing power is so small as to furnish little or no force to the system. Beef-tea as a stimulant is much abused, to the detriment of sick persons.

Alcohol, being at once a stimulant and a food, naturally takes its position, on its merits, as the agent required *par excellence* for the treatment of acute disease in its later stages; and also for the inauguration of convalescence. It can be combined with readily assimilable forms of food, with milk, farinaceous preparations, especially when given along with infusions of meat; and as such is an excellent agent. It furnishes by its stimulant properties that condition of the system which is necessary to the assimilation of other foods. What those stimulant properties consist in we have just seen. There is an action on the heart by which its activity is increased, and a more rapid propulsion of blood into the arterial system achieved. There is also an action upon the peripheral arterioles, which still further aids the rapid flow of arterial blood. This is seen in the effect produced by alcohol upon the encephalic circulation, upon the kidneys, and upon the skin. There is also an action produced upon the lining membrane of the stomach, whose vascularity is increased by alcohol. There is every reason to believe that a condition of hyperæmia of the organic nervous system is induced by alcohol, similar to its action upon the cerebro-spinal system. Indeed, it is strange if the organic nervous system alone escapes from the action of alcohol upon the arterioles. As a condition of arterial vascularity is intimately associated, causally associated indeed, with functional activity, there is, in the absence of direct proof, every reason to believe that stimulants, and especially alcohol, act upon the organic ganglia, and increase the activity of the organic processes. By means, then, of the combination of stimulants with easily digestible food, we secure assimilation in debilitated conditions, while we procure a loan from the reserve-fund of body-force, and so we are enabled to tide our patients through times of peril, and to inaugurate a satisfactory convalescence. As convalescence proceeds, the stimulation gradually

gives way to liberal supplies of food, and to the action of those agents termed "tonics."

The effect of alcohol upon the cutaneous vessels is such as to produce a free blood-current through the skin, and so to get rid of some of the excessive heat in high temperatures. This action is often very beneficial, and, added to the other effects of alcohol, points to its eminent usefulness in the treatment of acute conditions associated with high temperatures: alcohol also diminishes the chemical interchanges. This action upon the skin is much affected by the influence exercised by the other remedial agents given along with alcohol; and so its use in pyretic conditions, or apyretic conditions can be regulated, and the maximum of good effect secured.

The proper combination of alcohol with food and with tonics as the convalescence proceeds is a matter involving thought in each individual case. Very often the necessity for the administration of alcohol, except at meals, becomes abolished; but the custom lingers from the liking for the effects of alcohol, or from want of attention to the case on the part of the medical attendant. There is, unfortunately, much reason to fear that in some cases habits of indulgence in alcohol have taken their origin in some carelessness or want of caution in the medical man, who permitted the imbibition of alcohol to continue after it was no longer indicated. In early convalescence a glass of wine and a biscuit during the intervals of meals may be very proper, and be clearly indicated; but as the digestive powers become restored, and a larger bulk of food can be assimilated at one time, such irregular meals become less necessary. But too often the glass of wine remains, and is taken before or after a walk or a drive. "You had better have a glass of wine, dear, before you go out; you are not strong yet;" has laid the foundation of many a ruined life. Coca wine and other medicated wines are largely sold to people who are considered and consider themselves to be total abstainers. It is not uncommon to hear the mother of a family say, "I never allow my girls to touch stimulants of any kind, but I give them each a glass of coca wine at eleven in the morning and again at bed-time." Originally coca wine was made from coca leaves, but it is now commonly a solution of the alkaloid in a sweet and strongly alcoholic

wine. Alcohol is often permissible at meals, but it is desirable that it should take the form of a sound malt liquor, or some generous wine. But as a rule there should be no other consumption of alcohol except it be at bed-time, when it may be taken for its direct hypnotic qualities. The effect upon the cerebral cells is first to gently excite them into action, and especially to produce that pleasant emotional condition associated with a sufficient supply of arterial blood to the posterior cerebral lobes, and after such a condition sound sleep, either dreamless or free from unpleasant dreams, is achieved. Too frequently at bed-time the cerebral cells are wearied, and evoke *triste* or deeply-shaded thoughts as the outcome of their anæmic condition, and unhappy impressions tint the dreams and take away from the good effects of sleep in the convalescent. A draught of alcohol dispels the gloomy thoughts, and in this agreeable emotional condition sleep comes on, and is sound and refreshing; and no shadow of unhappy dreams is projected across the waking thought of the morrow. More extended experience convinces us more and more of the truth of what has just been stated above. That dilatation of the encephalic vessels, which is part of the first action of alcohol, is quickly followed by the dilatation of the vessels of the body generally; and this is succeeded by contraction of the carotids and lessened cerebral activity, and in this condition of cerebral anæmia sleep comes and wraps the patient in oblivion.

The chief dangers to be kept carefully in view in the medicinal use of alcohol are these. First, the administration of alcohol during the acute stage of the disease, and when there is great exhaustion, at times produces great gastric irritability. This leads to much evolution of gas in the stomach; this accumulates, and, by pressure, interferes both with respiration and the action of the heart. The patient is extremely ill, and another dose of alcohol follows, which aggravates the condition. In such cases alcohol should not be given by the mouth; it is doing more harm than good. Only the blandest matters should be taken into the stomach, and the brandy should be administered per rectum. This is the great immediate danger in the use of alcohol. Secondly, there is a danger of the use of

alcohol being continued as a habit. This danger is much greater with some persons than with others. The feelings created by alcohol are such as with some to form a dangerous allurement of a seductive character, and this possibility must never be forgotten by the medical attendant. Drinking habits are commonly attributed to medical advice as the least unpleasant explanation of their origin, by those who are so unfortunate as to have contracted such practice, without any such foundation in fact in many cases. Still there is room for grave fear that in some cases the statement is absolutely true; and that ever such a small proportion of drunkenness should so originate is a matter for deep regret. It may be absolutely necessary in the patient's interests to give alcohol, and freely too, at critical periods; but if this resort to alcohol degenerates into an evil practice, then it may be questioned how far it might not have been well to have let the case take its chance without this remedy, so potent for good or evil. Where the inclination to take alcohol lingers in too pronounced a form, it appears to me to be the bounden duty of the medical attendant to warn the patient and the patient's friends, in unmistakable language, of the dangers so incurred. As the convalescence proceeds, and ordinary food can be taken in increased quantities, the amount of alcohol should be distinctly diminished. In advanced convalescence alcohol should be abandoned, except at meals—when taken with food, or at bed-time. If indulged in at other times, it may turn out to have been a most unfortunate thing for the patient that the illness was survived. To pursue further the question of stimulants: More extensive observation has revealed to us the utility of agents which act upon the respiratory centres in the medulla and upon the cardiac ganglia. Thus now we know that ammonia is a direct stimulant to the respiratory centres. Strychnine and belladonna both act on the respiratory and cardiac centres, and are both useful in cases of collapse. Even the collapse of burns is influenced by these agents. Then digitalis acts upon the cardiac centres. The following are useful stimulants, with a more persisting action than alcohol; though they may be given with alcohol, they may often be usefully substituted for it.

Ammon. Carb. gr. v.
Tinct. Nucis Vom. ℥x.
Inf. Cinchonæ, ℥i.

is a good form of stimulant blended with a tonic; or at other times, especially when there is much perspiration, the following:—

Atropiæ Sulp. gr. $\frac{1}{100}$.
Liq. Amm. Anisat. ℥xv.
Aq. ℥i.

The Liq. Ammoniæ Anisatus of the Prussian Pharmacopœia has the following composition:—

Liq. Amm. Fort. ℥iii.
Ol. Anisi, ℥iii.
Sp. Vini Rectif. ℥xii.

§ 99. There is much that is instructive and suggestive in the careful consideration of the relations which exist between acute and chronic disease. We are all familiar with the tendency for acute disease to become chronic, or rather to persist in a modified form as a chronic affection; and, as such, to require a totally different method of remedial procedure. On the other hand, it is a matter of much importance to prevent chronic disease from assuming an acute form. Of the two certainly the latter is much the more common, especially in the recurrent inflammatory, or other acute ailments of advanced life. The consideration of both forms of the relations of chronic to acute disease is well worthy of our attention.

The most familiar instance of acute disease becoming chronic is the gradual merging of a gonorrhœa into a gleet. At first there is an acute inflammatory condition with pretty profuse cell-proliferation, the result of a sustained hyperæmia. This in time becomes a simple mucous discharge from the affected surface, holding its ground tenaciously; and not easily dislodged by the most persevering treatment. The acute cell-proliferation and hyperæmia have declined into a less active condition; which differs from the first in degree, but not in kind. There

still remains a condition of exalted local nutrition, with degradation of cell-products. Instead of a quiet and normal formation of epithelium cells to line the urethral tract, there is a production in excess of mucous corpuscles—imperfectly developed epithelium cells—which forms a discharge from the meatus. The condition is precisely analogous to the chronic bronchitis which frequently follows an acute inflammation of the bronchial membrane. It is often most difficult to get rid of these lingering perversions of nutrition. They may depend upon some peculiarly irritable condition of the mucous membrane; at other times there is some constitutional condition, as syphilis or suppressed gout, which may maintain an abnormally active condition of nutrition in the membrane over which an inflammatory storm has passed, and which has been altered thereby. Certainly the function of either membrane is scarcely compatible with physiological rest.

The methods of approaching the cure of these lingering modifications are various. There are two ways of laying siege to them: (1) general measures, and (2) local measures. To take the last first, there is the plan of applying astringents directly to the diseased surfaces. In chronic urethritis this is easily done. In bronchitis it is more common to try the effect of medicated inhalations, though by means of the spray astringents may be inhaled, and so be brought into contact with the bronchial membrane. Other different local measures may be resorted to under different circumstances, according to the indications furnished by the exigencies of each case. The effects of balsams and resins—gurjun oil for example—on chronically inflamed mucous membranes are well known. Thus copaiba, excreted by the kidneys, soothes the urethral mucous membrane; inhalations of allied substances, as pure terebene, spirits of juniper or tar, from an inhaler or sponge wrung out of hot water, are often very serviceable in chronic bronchitis. At the same time general measures may also be resorted to with manifest advantage. In all cases of lingering changes in organs, the result of some acute disease, the constitutional treatment is of the utmost importance. Not unfrequently a condition of low persistent cell-proliferation will obtain simply as the result of general debility, especially in the strumous.

There would appear to be a lack of capacity for perfect repair in an injured organ, depending upon general adynamy. In such cases good food, warm clothes, chalybeates, tonics, cod-liver oil, careful attention to the general health, and especially to the primæ viæ; together with a residence under suitable hygienic conditions and favourable surroundings, are indicated. Change of air, especially to some seaside resort, is often most serviceable; though it is not at all easy to say how such change acts. It is, however, a well-established empirical fact. In bronchial affections or affections of other respiratory organs, a mild and soothing atmosphere is often most beneficial; and residence in a cold region, where the air is also laden with mechanical irritants, is proportionately injurious. At all times it is a matter of the gravest importance to secure for the part as perfect physiological rest as is practically attainable. If the part be exercised, it is almost impossible for it to be thoroughly repaired in a short time. This it is which interferes with perfect recovery in parts whose functional activity is absolutely essential for the continuation of the existence of the organism. If the vela of the mitral valve could be placed at rest after an attack of acute rheumatism involving the endocardium we should see much less of the mitral disease so provoked. If we could relieve the kidneys of their labour, an attack of tubular nephritis would soon pass away completely; but unfortunately this is impossible.

In acute affections of the stomach nutrition may be effected by the rectum. When there has been an attack of meningitis or acute cerebral congestion, great quiet and inactivity on the part of the brain produce satisfactory repair. When a limb is fractured rest permits of union; and in inflamed joints splints and immobility are the great means for bringing the nutrition of the part back to its normal state. When such physiological rest is unattainable, the progress of a part towards recovery, when injured or diseased, is far from satisfactory or what we could desire; and such progress forms a strong contrast with the ready repair of parts which can be completely put at rest, and where the process of reparation is not modified by that hyperæmia which is necessary to functional activity. Absolute rest for the nervous system is necessary after railway

accidents. If the injured person does not attend to this, the railway companies ought to plead the fact in mitigation of damages; just as they do in injured limbs if the recognized rules of surgery have been violated.

At other times a general condition may obtain that interferes with the repair of any part which has been affected by acute disease. Such conditions are notably found in gout, rheumatism, and probably syphilis. The local action is modified by the constitutional condition; and a state of persistent activity is kept up which is most undesirable. Whenever it becomes manifest that there is such a general condition, and that this is the reason of the intractableness of the malady, then it behoves the practitioner to appeal to that general condition; to treat it, and so to remedy the local affection. Experience has shown the value of the recognition of constitutional conditions in the treatment of persistent local affections: and the recognition is usually the first step towards satisfactory treatment. Of course, at times the exactly correct treatment is accidental and fortuitous in its origin; and then the *rationale*, the connection of cause and effect, is not so palpable.

By such measures and means as have just been detailed do we strive to improve an injured organ and to secure for it complete and perfect repair—with more or less success. Our distinct aim is to give the injured part the best opportunities for repair by freeing it as far as possible from any functional activity that it can be spared, to secure for it physiological rest as far as is practicable; and at the same time to aid the reparative power of the system by placing it under the most favourable conditions, hygienic and other; and improving the general nutrition so as to enable the reparative processes to be carried on in a thoroughly efficient manner. In fact we try to "level up," to bring all parts to an equal condition of perfection.

§ 100. At other times, however, a very different plan of action must be adopted. Health, practicable health, consists in a balance of parts in power as well as in function. If there exist a distinct disproportion betwixt the body generally and one part in particular, the existence of the organism is imperilled by that very disproportion. This is readily illustrated.

A person has got a heart far advanced in fatty degeneration, and yet is generally active and vigorous. Such a condition not rarely obtains as the consequence of disease of the coronary vessels. His muscular efforts and capacity to exert himself are much more liable to bring that heart to a standstill from sheer adynamy; than is the case in another who is a general invalid, and therefore less liable to tax his degenerated heart. The case of aneurysm furnishes a precisely similar predicament. No chain is stronger than its weakest link; and practically the capacity of the elastic arterial system to resist distention by the contained blood is lowered to the point of the capacity of the walls of the aneurysmal sac. Any rise in the blood-pressure might easily rupture the sac and at once suspend the existence of the individual. Again, if a person be the subject of advanced renal disease, how much more likely is he to survive if the appetite be defective and the assimilation of animal food, especially lean meat, be correspondingly impaired. The instinctive choice of such persons is usually in favour of farinaceous and other non-nitrogenized food. At other times loss of appetite comes on, and so permits of the oxidation of the nitrogenized materials in the body; and consequently of their escape from the system. If these were permitted to accumulate, and instead of natural anorexia the normal appetite remained, the system would be imperilled, and uræmia would threaten; or some other affection, the outcome of lithiasis, would come on, and though essentially a cleansing process, might yet be fatal through its rigour. These losses of appetite in elderly persons with renal disease are often most beneficial, and are not to be regretted; neither should the patient be prevailed upon to drink beef-tea, soups, &c., measures which may be simply destructive. Rest in bed with slops, tea, arrowroot, and gruel, are infinitely preferable. Such rational practice, however, is unfortunately only too rare at present.

Whenever there is incurable disease in an organ whose function is very important to the microcosm, it behoves a wary medical adviser to "level down," to secure a new equilibrium by reducing the general condition until a balance of parts once more exists; in fact, to insist upon the habits of the invalid. If this can be done sufficiently thoroughly, then existence—an

imperfect existence truly—may be maintained for some time. If, on the other hand, the general condition bears no relation to the injured part, and that part is an important part from its physiological function, then some sudden catastrophe may be expected to occur at any time, and it may endanger, and often even cut short, the existence of the individual. In the same way in convalescence from acute disease in important organs, the relation of the organs to the body generally, the condition of those organs, their capacity, the necessity for remembrance of their function; the danger incurred by forgetfulness of these different matters: all must be borne in mind vividly if the management of the case is to be satisfactory and disaster avoided. Very necessary too is it to remember the mutual relations of parts in function in the treatment of various maladies. If in uræmic diarrhœa, for instance, the condition of the kidneys be overlooked, and the diarrhœa be arrested without the normal channel for the excretion of azotized matter being reopened, a general explosion of uræmia may be expected with confidence.

It will not do in practice to aim at too high a general condition in certain systems. Where chronic disease lurks in an important organ it is apt to be overlooked; and that oversight may be fatal, especially when the different viscera are affected. If chronic renal disease or fatty degeneration of the heart be not detected; their importance carefully appraised; and the line of treatment laid down in accordance therewith; sooner or later the grim importance of the oversight will become apparent. Sometimes it is necessary to "level down"; just as at other times and under other circumstances it becomes desirable to "level up" as far as is practically attainable.

§ 101. In a preceding section of this chapter the subject of acute disease becoming chronic has been discussed, and certain indications to be attended to in order to avert such result have been given. Now something may be said on the reverse, viz. on the tendency of chronic disease to become acute. This is a much more important matter than the question of acute disease becoming chronic. It is also when acute disease is the outcome of chronic conditions that it is most likely to be perpetuated, in a persistent if less active form. Thus, for instance, a condition

of chronic renal disease may lead to an acute attack of a serous membrane—a common outcome of such a condition of the system —and that serous inflammation may endanger or terminate the existence of the individual. It is obvious that if the chronic condition could have been so managed that the acute outbreak could have been averted, much suffering and no little danger might have been avoided. Or in another case the victim of constitutional syphilis becomes hemiplegic from a syphilitic tumour in his cerebrum. Now it is pretty certain that if the management of the syphilitic cachexia had been more efficient this acute manifestation of its presence might have been avoided. It is in the danger of chronic mischief assuming an acute form that the chief risk to life lies; and it is by such outbreaks, inseparable from the condition which obtains, and liable to occur almost at any time, that the patient commonly dies. The termination of many chronic maladies in which there is no blood-poisoning is by intercurrent pneumonia, as in general paralysis, aortic valvulitis, and locomotor ataxy. In such acute affections, arising during the course of fixed maladies, the danger to life is extreme; and the most watchful attention, and the most energetic as well as skilfully-directed treatment, are often, indeed usually insufficient to avert a fatal result.

It is obvious that the best plan of treatment of acute ailments arising out of chronic conditions is that of prevention. How this may best be done entails the consideration of the more chronic diseases to which we are liable, as to their nature, their course, and their outcomes. Firstly, we may consider those ailments all distinctly associated with assimilation, and so naturally arranging themselves into a group, viz. diabetes, rheumatism and gout. After their consideration something may profitably be said about the two great cachexiæ—syphilis and struma; and the question of diathesis—a very important matter.

CHAPTER XI

DIABETES—RHEUMATISM—GOUT

§ 102. THESE are three different affections more or less associated with the assimilative processes; and being so connected it is most profitable to consider them in a special chapter. The first two are connected with the assimilation and combustion of hydrocarbons in the body; the third is related to the excretion of waste nitrogenized matter, but is nevertheless very commonly associated with imperfect or modified nutritive processes.

Diabetes.—As we have seen in Chapter II., the nutritive material taken up by the portal circulation is stored up in the liver in the form of glycogen. It is formed directly from the saccharine food of man,—or indeed any animal,—from farinaceous matter converted into grape-sugar by the action of the saliva and the pancreatic fluid; and also from nitrogenized materials which are split up by the liver into glycogen and azotized waste matters, which latter by uniting with oxygen become changed into uric acid and urea, and are excreted as such. In fact the liver is the great storehouse of fuel, where the products of food are garnered and given off according to the requirements of the system. The carbo-hydrates of the food passing into the blood of the portal vein in the form of dextrose are in part arrested in the liver and stored up as glycogen in the hepatic cells, to be gradually given out again in the intervals of digestion. This glycogen is gradually given off and is reconverted into sugar, and then burnt up in the body; producing in its oxidation carbonic acid and water, and evolving in its combustion mechanical results and heat. In ordinary and healthy individuals the sugar so furnished to the blood is perfectly con-

sumed; but in others such is not the case. There is probably always a trace of sugar in the blood and in the urine under conditions of health, but it is far too little to give the characteristic chemical reactions. Persons may waste to death, and yet no sugar show itself in the urine; at other times sugar may be found in the urine in persons in perfect health. The reader must not imagine that because he has detected sugar in a patient's urine, that therefore the sugar-producing individual is going to die; or even necessarily be ill. If a person be obviously very ill and wasting, and sugar be found in the urine, then its appearance is ominous.

There is some difference of opinion as to the reliability of Fehling's solution as a test for sugar, but the general opinion is that it is capable of detecting a tenth of a grain in an ounce of urine. There are, however, certain fallacies to be avoided, and it is necessary to bear in mind that other substances besides sugar will produce a precipitate. Dr. Hebb, who has devoted a good deal of attention to the subject, says:—

"My experience of Standard Fehling has been this: with diabetic urine it almost invariably gives a canary-yellow precipitate, usually early, though sometimes late. To the character of this precipitate some weight should be attached, because precipitants other than diabetic urine do not react in the same way. For example (taking of course only such substances as do or may occur in the urine, of which urea and hippuric acid may be put out of court at once, as they do not react at all to Fehling or to phenyl-hydrazin), uric acid, urate of soda, kreatinin, chloroform, salicylic acid, do not produce a precipitate which resembles the yellow deposit from diabetic sugar. With Standard Fehling the precipitate from uric acid, kreatinin, and chloroform is reddish-brown, but of different hues. Salicylic acid urine, urates natural and artificial, bring down variable quantities of a dirty-olive-green precipitate. When very dilute Fehling is used the reaction colour from uric acid and chloroform is yellow. Even with pure glucose there is a difference, for with normal Fehling the precipitate is orange to brown, with dilute yellow.

"And not only so, but the manner of the reaction varies, that with diabetic urine is nearly always quick and easy; most other precipitants are slow and seem to affect their purpose with a

struggle, while with chloroform the reaction comes like a flash when it does come, but not till the solution is cooling down.

"As a rule the precipitate from diabetic urine is early, but it may be late. If late it indicates a small amount of sugar, and almost always occurs when the specific gravity is low for diabetes, and this suggests the possibility that a late precipitate may account for the occasional disappearance from or overlooking of sugar in the urine in certain cases, and especially in warm weather. I think that will be enough to show that the so-called fallacies inherent to Fehling are much overrated, and that too little stress has been laid upon the characters of the precipitate."

Some authorities speak highly of the phenyl-hydrazine test. From two to three drachms of diabetic urine, two grains of phenyl-hydrazine and three or four grains of acetate of sodium are boiled together in a water-bath for about half-an-hour. On removing the test-tube from the bath, a yellow crystalline deposit will be noticed, which under the microscope will be found to consist of greenish-yellow acicular crystals. Other substances besides sugar will give a precipitate when treated in this way, although perhaps not of the same character. Fehling's solution is sufficiently delicate to detect sugar in the urine when pathological in quantity, and it is quite as trustworthy and much more convenient than the phenyl-hydrazin test.

In order to comprehend the importance of sugar-laden urine, we must review the circumstances under which glycosuria is produced. In many cases it is only found shortly after meals, and is absent during fasting. Here the sugar which should be stored up in a glycogenous form is but imperfectly restrained from entering the general circulation, and there is an excess at one time with deficiency following after. In such cases the liver is but imperfectly functionally operative. At other times there is some irritation at the roots of the pneumogastric nerves, as in Bernard's experiments of puncturing the floor of the fourth ventricle, or in the cases related by George Harley and Dickenson of diabetes the result of excessive brain-labour. The formation and garnering of glycogen is connected with the portal vein; its disengagement and restoration to the blood are

associated with the hepatic artery. When the hepatic artery is dilated sugar is quickly given off in large quantities from the liver stores. By such mechanism irritation of the vagus produces an excessive amount of sugar in the blood. Conditions of high arterial tension causing a rise of pressure in the hepatic artery, give rise to an excessive disengagement of sugar. Glycosuria is very common in persons suffering from Bright's disease, and in conditions where the blood-pressure is raised temporarily, as in the accession of cold in early winter. In this last form it is usually connected with a sedentary occupation; if active exercise be taken in the cold the sugar is burnt up, and in doing so raises so much body-heat. In other persons again glycosuria is the consequence of simple excessive formation of glycogen, or of sugar not converted into glycogen, beyond the necessities of the system, without conversion into and development of fat, in which case it drains away in the urine and is only discovered by accident. In some cases it follows the consumption of certain articles of diet and passes away when they are given up. In all these cases the presence of sugar in the urine is comparatively unimportant.

A much more serious matter is diabetes, the result of incapacity of the liver to transmute the sugar in the blood of the portal vein into glycogen, so that it remains in the blood as sugar; or of loss of capacity to oxidize the sugar assimilated, from some peculiarity in the sugar itself, or other cause, or where there is defective assimilation. In such cases there is muscular weariness, the result of defective combustion of sugar in the muscles; where it is nominally burnt up, after being broken up into lactic acid and oxidized as a lactate of the alkalies, chiefly of sodium. There is much wasting, because the body temperature and muscular action (mechanical results) must be maintained by the combustion of other hydro-carbonaceous material, as the stored-up fat of the body. There is much thirst from the presence of sugar in the blood in large quantities; and the bulk of urine is large, for the sugar in solution by this means is got rid of. It is, however, much better that the sugar be so got rid of, when in the blood, than if it were not so eliminated. It is not the presence of sugar in the urine—though of course it is a waste of raw material—which should occasion

anxiety; it is the circumstances under which sugar so shows itself that should excite our apprehension. The loss of body-weight is often more important than the presence of sugar in the urine.

Dr. Michael Foster in his Huxley Lecture dwelt at considerable length on Bernard's discovery in 1850 of glycogen. This had an immediate and direct effect on medicine in throwing light on that terrible disease diabetes, a light which, even if it has not fulfilled the hopes which were first held, has at least, by pointing the way towards alleviation, saved much suffering and greatly prolonged valuable life. But this has been only one and not the greatest of its effects. It has had a most powerful influence as the mother of ideas. It was the first clear direct proof of the synthetic powers of the animal body, and as such has been the parent of great additions to knowledge, more especially in these latter days. But its chief influence has been, perhaps, by showing how a tissue in a hidden way profoundly affects the blood, apart from any visible event, such as an outward blow, of secretion fluid, or a muscular contraction or a nervous impulse. It was the first exemplar of what we now call "internal secretion."

There is much investigation yet required on the subject of the different *ferments* in the body by which, among other actions, the sugar given off by the liver into the general circulation is broken up into lactic acid. These ferments are found most largely in the pancreas, and probably thence find their way into the portal circulation. They also exist in muscle. Recent experiments point to the pancreas as intimately concerned in the metabolism of sugar. Excision of this organ in dogs causes permanent diabetes, which is prevented when a portion of the pancreas is left, or if it is transplanted under the skin of the abdomen.

"The most rational way of explaining many of the facts of diabetes is to suppose that from some change in the tissue elements, sugar has ceased to be a food for them, or is used up in smaller amount than in the healthy body, while the actual production of sugar is no greater than in a normal person with the same diet and the same intensity of metabolism of substances other than carbohydrates" (Stewart's *Manual of Physiology*).

At times sugar is found in urine that is albuminous. This may be the result of some nerve irritation standing in a causal relation to both. At other times they are found together towards the close of chronic renal disease, where the patient begins to waste; and in such cases a fatal result is usually not far distant. Whether the elimination of sugar in the course of time produces organic changes in the kidney, or disease in the kidney permits of the sugar in the blood draining away and so being lost, it is not yet possible to say. Certain it is that the two are commonly found together. Sometimes the indications so given are of the worst import; at other times they form no serious omen. It is of much importance to examine the urine of patients in the latter stages of chronic Bright's disease for sugar; and if it be found the prognosis is very bad.

§ 103. In the treatment of diabetes there are many points to be attended to. Too commonly it is thought sufficient to put the patient on gluten-bread, and cut down the consumption of saccharine and farinaceous material to the minimum. Doubtless it is very desirable to give the patient food that he can oxidize; and to relieve him from the sugar which is no longer useful to him, but which entails upon him thirst and other troubles; but there are other important points to be attended to. The skin should be kept warm, and the circulation of blood in the cutaneous vessels be well maintained. By such means the blood-pressure is lowered and the disengagement of glycogen diminishes. Exercise is a good means of securing this end, and should be combined with warm clothing. Exercise, too, brings the blood freely to muscles, and with it brings the sugar more in contact with the ferments in the muscle. It requires great determination in the face of the existing languor to continue to make muscular efforts, but the results are very satisfactory. To carry into effect regular and sustained daily exercise, requires great moral courage and energy, the languor and weariness are so great; but, if the exercise be only carried out patiently and perseveringly, the task will not only become more and more easy, but soon no longer a task, but positively a pleasure. The glycosuria of a sedentary, intellectual life may possibly be nothing more than unconsumed sugar draining away.

At the same time that exercise and a warm skin lower the blood-pressure in the hepatic artery, it must not be forgotten that the thirst of diabetes, while it secures plenty of fluids to wash out the sugar in the blood, also fills the blood-vessels with water, and so increases the general blood-pressure; and with it the pressure in the hepatic artery. It is certainly desirable that the consumption of fluids when very great should be moderated.

The diet should consist of meat, especially fat meat,—particularly in the glycosuria of the lithæmic, where the waste products of nitrogenized foods will themselves be a source of trouble—of vegetables not containing starch, of various more or less impalatable breads and biscuits, prepared by several makers, of dry wines, and spirits-and-water instead of malt beverages. The different alkaline waters, natural or artificial, are also very useful. The skim-milk treatment suits some cases admirably, but butter-milk is even better; and in rural districts where butter-milk is procurable it should form a staple of the dietary. In many cases peptonized milk may be used with advantage. Koumiss is also a suitable beverage. The lactic acid of milk so treated is an oxidizable food, and so is useful to the diabetic patient.

Of the remedial treatment of diabetes much may be said. The plans of treatment are various. Some give large doses of arsenic; others pin their faith on alkalies; while with most it is the practice to give opium, or codeine. Opium may be given in half-grain doses three times a day to commence with, and the dose may be gradually increased. Codeine may be given in similar doses, or even as far as five grains three times a day. In the treatment of diabetes, however, codeine has no advantage over morphine given in doses of from a quarter to half a grain. These sedatives are specially suited to those cases which are dependent upon some nerve irritation. The action of opium upon the skin is very useful in many cases; and this action may be aided by Turkish or other warm baths. Attempts have been made to directly oxidize the sugar by giving peroxide of hydrogen (ozonic æther), but with little success.

Iodide of iron, combinations of quinine and iron, and other

tonics are often indicated; and the diabetic patient may be treated on general principles with advantage at times, while his special malady is met by appropriate diet merely. Tonics and cod-liver oil are as good for him as for others suffering from wasting disease. If the nutrition fails on a too restricted diet, modify it by all means. It is of no use to kill a patient or make him worse in well-meant but unfortunate attempts to do him good; and in the treatment of diabetes it is of the greatest moment to watch and follow the indications of each individual case.

The dietary of diabetic patients is not to be laid down by rule of thumb. If the patient wastes on any dietary, then that dietary should be altered. Wasting is the index for treatment rather than the amount of sugar in the urine. In one case, sugar was accidentally found in the urine. The patient felt well, but nevertheless he went to a well-known authority on diabetes, who put him on a rigid dietary. On this he wasted rapidly; and became so ill that he returned to his ordinary food, farinaceous and saccharine. On this he quickly improved, became hale and strong, and remained so for twelve years. A certain amount of glycosuria is common with stout persons, and is probably merely a sort of "waste-pipe" getting rid of superfluous food. These cases of glycosuria must be distinguished from true diabetes.

§ 104. *Rheumatism.*—It is somewhat depressing to have to acknowledge that very little is known about the pathology of rheumatism. Considering how common acute rheumatism is, and how general it is to denominate all pains which are persistent and yet unaccompanied by general constitutional disturbance "rheumatism," it seems strange that we should have so little real knowledge as to its causation. As to acute rheumatism, it is a fairly well-defined disease. As to "rheumatism," it covers an immense range of pains, extending from the lightning pains of locomotor ataxy to the periosteal affections caused by syphilis. The term "rheumatism" ought to be expunged from our vocabulary. It is a great comfort to those who are diagnostically weak; and has given a false sense of security in many grave diseases, and tended to hide the real nature of the malady. As to the use of the term by non-

professional people, it is excusable; they are not expected to know better; they use it in ignorance, but with perfect *bona-fides*.

There are no means of ascertaining how much of so-called rheumatism, and especially articular and muscular rheumatism, is gout, or rather lithiasis. The people who have accumulations of uric acid in their blood and tissues, are persons who complain of rheumatic pains. After long and careful consideration of the matter, it becomes more and more difficult to distinguish any differential characteristics between chronic rheumatism and lithiasis. In symptoms, in prognosis, and in treatment, they are identical, and the question resolves itself into a choice of terms; and in this respect rheumatism carries the preference. Lithiasis, and still more the term "gout," at once arouses a Philistine opposition; it savours of good living and self-indulgence—two things which many instinctively turn away from in speech—and turn towards in practice. Any allusion to gout is in itself sufficient to cause many persons to seek another medical adviser, who will be discreet enough not to give objectionable names to painful maladies. Rheumatism is innocent and free from suggestiveness, and consequently holds its ground; indeed is rather a general favourite. Rheumatism as a malady is supposed to stand in a certain relationship to lactic acid. When glycogen is given off into the general circulation, it is converted back again into sugar. This sugar is broken up into lactic acid, which unites with the alkalies in the body, and forms lactates. Headland supposed that it is the oxidation of lactates which gives rise to the body-heat, and these views are borne out by the researches of Ludwig and others. Each molecule of soda burns off many different relays of lactic acid during its residence in the organism. Prout evolved the idea that rheumatism was connected with lactic acid, and the late Sir Benjamin Richardson followed up the idea by giving lactic acid to dogs, injecting it into the peritoneum, and found endocarditis to follow. The proof is insufficient, but is enough to give an air of probability to the hypothesis; for Sir Walter Foster found acute rheumatism produced by medicinal doses of lactic acid given to diabetic patients. Rheumatism must be considered in relation to its acute form and its chronic form.

§ 105. *Acute Rheumatism*, or Rheumatic Fever, as it is called, is a very common malady, and though rarely fatal at once, is very frequently the cause of early death from its effects upon the heart. The different joints and the outer and inner surfaces of the heart are the seats of inflammation in rheumatic fever. There are—as in gout—localized inflammations associated with a general condition. Another point connected with rheumatic fever is this, if the action going on in one part is checked, increase in the action elsewhere is very liable to occur; *i. e.* if the inflamed joints are wrapped in cold lotions the cardiac complications will be increased; or induced, if not already existing.

There is practically only one method of treatment to be adopted in acute rheumatism, and that is the Salacin treatment, introduced by Dr. Maclagan. The *Medical Press and Circular*, in a review of the second edition of Maclagan's *Rheumatism*, says with much truth:—"There are indeed but few physicians, if any of those now living, who can point with confidence to so valuable a boon to suffering humanity as that which it has been the happy privilege of Dr. Maclagan to confer. Indeed, of past and present physicians, there is hardly one who by his own unaided efforts has done so much for the elimination of prolonged suffering of the most aggravated and hopeless kind." It is probably not a matter of very much importance which member of the group is used; salacin, salicylic acid, salicylate of sodium, salol, are all efficacious. Under the influence of this treatment the symptoms were arrested within five days in 180 out of 355 patients, and in a large number of these cases the patient is free from pain on the second or third day. Any remedy which has the power of arresting acute rheumatism must also hinder the development of the analogous inflammation in and around the heart. At one time one used to hear a good deal about the depressing effects of the salicylates, but since the introduction of absolutely pure salts and preparations this has become a thing of the past. Up to a comparatively recent period this malady very commonly persisted for fifteen or twenty weeks, leaving the patient a wreck, and often a cripple as well, in spite of every measure: now it takes itself off on the slightest summons.

With regard to general treatment, there should be a liberal supply of milk and seltzer-water, as the thirst is great and the temperature often high. Indeed, the high temperature and the profuse perspiration are often alluded to as sufficient to excite surprise. The question is really how much higher would the temperature be if it were not for the perspiration? Probably so high as to be incompatible with the continuation of the existence of the organism. The perspiration is often intensely sour, and this sourness is perceptible to the olfactory organs. The urine is often laden with urates, probably to some extent the result of the effect of the high temperature upon the muscular structures. There are some points to be attended to, and others to be kept in mind and avoided, in the treatment of acute rheumatism. The first is to keep the patient in blankets—no sheets. Next, to put him or her into a woollen garment, as a woollen night-dress—amidst the poor the flannel shirt of a male relative is a capital thing. Then all movement is to be avoided; consequently it is not desirable to cause free purgation. Nothing can be worse than exposure of the thorax, and unnecessarily repeated examination of the chest is to be reprobated. Physical examination is not often productive of good, and tends to turn the attention away from the real needs and necessities of the case. It is often directly productive of harm. Diagnostic inquisitiveness often stands in an inverse ratio to a rational plan of treatment: in Vienna it may be seen in its most highly-developed form. It is not confined to Vienna, however, and the treatment of acute rheumatism in this country needs much modification. Every examination as to the condition of the heart should be conducted with the least possible disturbance to the patient, and with the very least exposure to the chest, and the search after obscure murmurs which may be proper enough in a teaching hospital is not often required elsewhere. The chest should be well covered, and if any pain is felt in the neighbourhood of the heart, or a murmur is heard, hot linseed-meal poultices should be placed over the whole of the front of the chest and kept there constantly, being repeated at frequent intervals; each change being effected with the least possible disturbance of the patient. The painful joints should be wrapped up in cotton-wool, or kept in flannel saturated with

alkaline solutions, always as warm as can be borne, or as circumstances will permit. Such is the line of treatment to be pursued. Warmth and quiet are the two things to be aimed at. If there is pericarditis it is quite unnecessary to give calomel, or any preparation of mercury. Large doses of opium are tolerated, especially when given with alkalies, and the action of opium on the skin is almost as important as are its analgesic properties.

When the pains are somewhat subdued the opium may be withdrawn. After a while the dose of potash may be reduced and a few grains of iron added:—

Pot. Bicarb. gr. xv.
Fer. Am. Cit. gr. v.
Inf. Quass. ℥i.,

three or four times a day, is a good combination when the brunt of the malady is over. In cases where the heart had been already injured in a previous attack of acute rheumatism, the addition of digitalis to the remedies produces an improvement at once. Its use under such circumstances is clearly indicated, especially if the lips be blue.

If the subject of rheumatic fever is delicate, or of the strumous diathesis, it is a good plan to continue during convalescence the combination of alkalies and iron for some weeks; and to give cod-liver oil, liberal supplies of food, especially hydro-carbonaceous, and to keep the body well-clad in flannel. A change to the sea-side may be useful; but the diet and clothing must be doubly attended to then. By such means the troublesome affection of the small joints, known as rheumatic gout, may be usually avoided,—and that is no small matter for the patient. If the mitral valve is injured, a course of digitalis and iron combined should be commenced at once, general quiet being observed; and the plan should be continued for weeks or months. By such means the ventricle may be brought back to its normal dimensions, the valves may once more be competent to close the ostium, the murmur may disappear, and the patient may be to all intents and purposes cured—except that the mitral valve has lost its spare or redundant closing power, and

in any future dilatation of the left ventricle will readily become insufficient. No amount of dilatation will render the mitral valve incompetent, if its valvular vela are not restrained by pathological connective tissue from themselves stretching along with the dilated ventricle. Often the murmur is lost after rheumatic fever, and only reappears when dilatation of the left ventricular chamber with enlargement of the auriculo-ventricular ostium has revealed the insufficiency in the valves; which have been injured by the fever, but were equal to closure of the ostium prior to the dilatation.

§ 106. *Chronic Rheumatism.*—This term is applied to many forms of pain unaccompanied by general constitutional disturbance. In its more precise sense it includes a series of pains confined to the limbs and the shoulder and pelvic girdles. Lumbar pains are either gouty or myalgic usually. Rheumatic pains are felt in joints, in muscles or their fasciæ. They are persistent and unintermitting. In this they differ from the gusty intermitting pains of true neuralgia. Frequently they cover a certain area—not being the part over which any nerve is distributed, nor possessing any natural boundaries.

Rheumatic pains also depend much on changes of temperature, and are common in parts that have been chilled by exposure. The thigh especially exposed to the rain during a stormy ride, or the shoulder which is in a draught, are the common seats of chronic rheumatic pains. If the pains are restricted to the collar-bone, humerus, and the shin, they suggest the probability of a syphilitic factor. When instantaneous they are ataxic.

When then we have such pains as come fairly under the category of chronic rheumatism, the next question is that of the remedial measures to be employed. One thing is pretty certain about the class of cases now under consideration, and that is, they are almost invariably accompanied by an inactive condition of skin. A distinct part of the treatment includes diaphoretic remedies, and especially stimulant diaphoretics. Guaiacum is perhaps the most typical of these. Chloride of ammonium is another. They form an excellent combination in the rheumatism of young men and women. The following mixture:—

Ammon. Chlorid. gr. xv.
Mist. Guaiaci, ʒi., ter aut quater in die,

often gives excellent results. Whenever there is a history of exposure in elderly persons, especially when associated with a florid complexion, guaiacum with iodide of potassium is good:—

Pot. Bicarb. gr. x.
Pot. Iod. gr. v.
Mist. Guaiaci, ʒi., ter aut quater in die.

The skin must be kept warm and covered with flannel. Warm drinks are indicated, and should largely take the place of solid food. It is desirable to give a diaphoretic at bed-time. If the bowels are confined a grain and a half of calomel with three grains of Plummer's pill is indicated, to be followed by a draught of alkaline purgative water next morning. By such means faulty assimilation is corrected. At other times the following mixture may be prescribed:—

Pot. Bicarb. gr. x.
Pot. Iod. gr. v.
Tinct. Colchici, ♏x.
Inf. Cascarillæ, ʒi., ter in die.

In all cases a draught of water should be taken after the medicine; it not only serves to wash it down, but it fulfils a very important function in the economy. Whenever alkalies are given either along with, or without chalybeates, free dilution is ever desirable. There can be no doubt that free dilution exercises a most important influence on the action of almost all the remedies which prove useful in this class of disorders, and that a dose which would excite nausea and irritation of the stomach when taken in a concentrated form, is often productive of excellent results when aided in its action by water. Hence, probably, the efficacy of the natural mineral waters; and hence, also, the superior effects which often ensue after taking the weak infusions or teas, which are the favourite remedies of the poor and the nostrum of so-called herbalists.

Our medicines frequently fail in their operation for lack of sufficient dilution; and it is an excellent plan to take a copious draught of water, or some harmless diluent, after each dose of the remedy. Whenever the means of the patient admit of it, natural waters should be freely taken—Vals, Vichy, Carlsbad, or Buxton waters are all suitable; and with them the bitter water of Fredericshall, or Marienbad waters, may be taken in the morning as laxatives. Frequently barley-water and bitartrate of potash (℥i. to the Oii.) may be drunk with advantage. In chronic cases this combination may be taken along with the well-known remedy, "the Chelsea Pensioner." Its formula is as follows:—

Flowers of Sulphur, ℥ii.
Cream of Tartar, ℥i.
Powdered Rhubarb, ʒ ii.
Guaiacum, ʒ i.
Clarified Honey, lb. i.
One nutmeg finely powdered.

Mix the ingredients. Two large teaspoonfuls to be taken night and morning. The addition of a small dose of arsenious acid to some such combination is useful. The following may serve as an example:—

Acid. Arseniosi, gr. iii.
Pulv. Guaiaci, ʒ iii.
Pulv. Capsici, ʒ ss.
Pil. Aloes et Myrrh, ʒ iii.
In Pil. cxx. div. 1 bis in die.

This is a convenient form in a chronic case. The value of fatty food in the treatment of these cases should never be forgotten, and if necessary cod-liver oil should be given. The various combinations of iron with alkalies may be resorted to with advantage when the pains are distinctly diminished, and the necessity of improvement of the general health is indicated.

In addition to the general measures it is customary to use local applications in the treatment of chronic rheumatism. The most favourite of these consists of the application of hot irons, plasters, and liniments. The Emplastrum roborans, Emplastrum

opii, or Emp. ammoniaci c. hyd. are good plasters, which the shrewd practitioner will do well not to discard. At other times liniments, as the compound soap liniment with iodide of potassium, are far from useless. When the pain is chiefly confined to the sciatic nerve, whether it be rheumatic, gouty, or neuralgic, the following is useful as a local application :—

Lin. Aconit. ℥ ii.
Lin. Belladonnæ, ℥ ii.
Glycerine, ad ℥ii. ;

and it is even better if treacle be substituted for the glycerine. This should be spread upon a long V-shaped piece of lint, and placed upon the thigh. Over it should be laid a piece of oil-skin, large enough to overlap the lint, and then the whole should be kept in its place by a bandage, or a stocking from which the foot has been removed. This should be done every night at bed-time. The lint should not be removed every night, the saturation of it by the liniment rendering it more powerful and efficacious. In using this potent measure care must be exercised to see that the skin is whole, or dangerous absorption may take place. One great object in the treatment of chronic rheumatism is to excite the action of the skin. By this means the lactic acid is eliminated. Alkalies are useful in uniting with it and so procuring its elimination, by oxidation or otherwise. The value of local analgesics is obvious. When these measures fail or are but partially successful, change of air is desirable. The effects of such a change, especially when it can be combined with alkaline waters, both as beverages and as baths, are often very satisfactory.

It is always desirable to maintain the action of the skin by the use of warm clothing; and the rheumatic person should be clad from top to toe in flannel, or even in what is termed "fleecy hosiery," or in chamois leather. By these measures an existence may be rendered tolerable which would otherwise be simply insufferable. Many persons speak very highly of the benefit they have received from the brine-baths of Droitwich.

Massage is useful in many cases of rheumatism, but its application requires a good deal of care and attention or it may do more harm than good.

§ 107. *Gout.*—This affection is much better understood than the immediately foregoing complaint. Its nature is however much obscured, and the proper comprehension of it hindered by preconceived impressions and prejudices. From its association with good living and the habits of "the Regency," there is a very decided impression in the minds of many persons that gout indicates some self-indulgence; if not ostensible, all the worse; or a descent incompatible with their surroundings—a still more objectionable matter. It is desirable that the term "gout" should be confined to ostensible ailments in the upper and lower extremities, the term "lithæmia" or "lithiasis" being used for other maladies taking their origin in the presence of lithic or uric acid. "Irregular," "suppressed," or "latent" and "retrocedent," are adjectives which are applied to gout, and explain, to some extent, the peculiarities of each case. It is obvious enough that when ailments depend upon a certain *materies morbi* circulating in the blood and fluids of the body, they will be both numerous and Protean. It would certainly be much better to use the term lithiasis to signify the general condition on which the malady depends. Being a comparatively new term, it will not possess the disadvantages of having any preconceived opinions about it to create objections or wrong impressions. It will carry a correct conception of the condition, viz. that it is a saturation of the body fluids with nitrogenized waste, in its most persistent form—lithic or uric acid. Such being the case, it may manifest itself as muscular rheumatism (so-called), as a skin eruption, as dyspepsia, bronchitis, or inflammation of a serous membrane, as well as in affections of the articulations.

The amount of uric acid in the urine previous to and in the early stages of an acute attack of gout is much diminished. At the time that the urine is deficient in this principle it exists in the blood in abnormal quantities. In chronic gout the blood, even in the intervals between the exacerbations, was always rich in uric acid. Since the pathology of lithiasis, or gout, has been cleared up, a great improvement has taken place in our remedial measures. As yet, however, we do not quite know how far the accumulation of uric acid in the blood is due to imperfect oxidation; to impaired renal activity; or

to diminished action of the skin. Recent observations would tend to lead to the opinion that defective action of the skin may not be without effect in the accumulation of nitrogenized waste in the system where there is inadequate renal action. In the subjects of chronic renal changes it is common to find an inactive and dry skin. Potash, especially, as iodine of potassium, passes off by the skin as well as by the kidneys. It also renders uric acid highly soluble; and as uric acid has a stronger affinity for potash than for soda or ammonia, its administration converts sparingly soluble urates into a highly soluble urate of potash. When so dissolved, uric acid finds its way out of the body by every emunctory of water. Lithia excels potash in its power of rendering uric acid and urates soluble.

In order to grasp more thoroughly the nature of gout or lithiasis, it is well to remember that when kidneys first appear in the animal kingdom the form of nitrogenized excretion is uric acid. Uric acid, as urates, belongs to animals with a three-chambered heart and a solid urine—birds and reptiles. When mammalia are developed, we find a four-chambered heart and a fluid urine; the form of nitrogenized waste being the soluble area. Certainly minute quantities of uric acid are found in healthy urine, it must be admitted. But when the liver fails in the (practically) complete conversion of nitrogenized matters into the soluble urea, it falls back, or reverts to the formation of the earlier form, uric acid. To the question then, "What is gout?" the answer is—"Gout is hepatic reversion: the formation of primitive urine-products by a mammalian liver."

From this consideration we can understand the genesis of gout. So long as the liver is equal to the complete conversion of nitrogenized matters, so long indulgence in savoury animal food is safe from evil consequences. But when the liver is unequal to the labours imposed upon it, then we find uric acid with all its far-reaching consequences. That a tendency to gout or lithiasis, or uric acid formation, should be hereditary, and, what is more, be found in families who have for generations kept a table, is no matter for surprise. The man of long descent and of "blue blood" is usually also the inheritor of an

insufficient or reptilian liver; while the plebeian alderman, with a perfect liver, eats and drinks with impunity, until his indulgence brings fruit only in old age—or, indeed, he may escape himself scot-free, and only leave the tendency to uric acid formation (along with his wealth) to his descendants.

108. Before, however, we can proceed further in the consideration of lithiasis, it becomes absolutely necessary to run over its most common manifestations.

First, excess of uric acid does not necessarily depend upon very high living. This idea must be dispelled. At the same time it can be, and very often is, so originated. At other times it takes its origin in imperfect oxidation of the nitrogenized matter which results from the splitting up of peptones in the liver into glycogen and waste azotized matters. Very commonly it is the consequence of impaired functional activity in the kidneys; not, perhaps, necessarily due to structural changes, but still commonly so associated. Lithiasis may show itself in a working woman as well as in a wealthy squire. Whatever the difference in the causation the result is the same, viz. an excess of uric acid in the system. It will not necessarily follow that the treatment will not be modified by the mode of origin: far from it, it will vary very much with the causation of the condition. In the squire, colchicum, partial starvation, and free purgation with alkaline salines, will probably form the first line of attack. In a working seamstress, cod-liver oil, and potash with iron, well diluted with water, will be the measures most indicated.

Lithiasis may manifest itself in the articulations. This is its best known form. Not uncommonly the local deposition of uric acid as urate of soda, leads to much deformity, and not rarely to the formation of abscesses where the pus is highly charged with urate of soda. At other times there is effusion into joints, especially the larger ones, with modifications of the synovial membrane. Or the ligaments may become infiltrated with lithic acid, and become rigid and immovable, entailing much loss, or even abolition, of movement in a joint. At other times, tophi, or chalkstones, form elsewhere, as on the helix of the ear. Microscopically these consist of crystals of uric acid in combination with a base, usually sodium. These

external changes, recognizable by the eye, often furnish the diagnosis of the malady before any more special investigation is commenced, and always give indications for treatment. Not uncommonly the lobe of the ear gives evidences of a tendency to lithiasis; it is full, glistening, and red, and seems, in very marked cases, to be on the point of bursting, so tight is the skin. Affections of the respiratory organs are very frequent, bronchitis being the most common manifestation of gout next to arthritis. In winter there is usually more or less of it, and the bronchial lining membrane becomes an excretory organ when the fall of temperature checks the action of the skin. Attacks of dyspnœa, the result of bronchial spasm, are also not unfrequent. Even pneumonia may have a gouty origin. The organs of the circulation are very commonly affected, and attacks of palpitation and intermittency of the pulse are commonly the result of lithiasis. The changes in the circulation are distinct and well marked in chronic renal disease, where a condition of lithiasis almost necessarily obtains. The brain and nervous system generally are also affected in lithiasis; and vertical headache is often very suggestive in atonic cases. There are also psychical changes very commonly found in chronic latent gout. They consist of a certain amount of brain activity with irritability out of all proportion to the exciting causes, together with depression. These mental symptoms are usually present, and should always be inquired into; and when found are very suggestive. Neuralgia is very common in lithiasis. Such neuralgiæ are found in advanced life, and are very intractable, especially if their systemic associations be forgotten. Serous membranes are very liable to become inflamed in latent gout. At times there is no effusion as in the dry pleurisy, often denominated pleurodynia. Mucous membranes, bronchial, intestinal, and vesical, are all apt to become inflamed from the presence of uric acid in excess in the fluids of the body. Affections of the skin are frequently of gouty origin; eczema, prurigo, and psoriasis are the forms most commonly met with. Boils and carbuncles are common in the subjects of lithiasis. The changes in the kidneys are the causal associations very commonly of lithiasis; and in well-marked cases the kidneys are always involved. There is a

liberal elimination of water, which is, however, usually of low specific gravity. It may at times contain small quantities of albumin but this is mostly absent. In fact we may see that such a condition of the fluids of the body can originate the most varied ailments, and of all maladies lithiasis is undoubtedly the most Protean. No matter what the outward form, the inward thing is ever the same, and the line of treatment is to remove the uric acid, though the necessities of different cases may call for modifications in the plans for doing so. Again and again it has fallen to everybody's lot to be successful in the treatment of cases of dyspepsia and bronchitis which have resisted all attempts to cure them by such measures as bismuth mixture and expectorants, but which have yielded readily to fifteen grains of bicarbonate of potash three times a day in a bitter infusion, or infusion of senega. At other times cardiac troubles of an apparently alarming character have vanished at the solicitation of potash and buchu. Skin affections of an obstinate nature have likewise passed away on the adoption of remedial measures which struck at once at the causation of the affection. In affections depending upon the presence of uric acid more than in any other—unless, indeed, it be syphilis—is the mere recognition of the ostensible malady subordinate and of secondary importance to the clear comprehension of the causal relationships, for success in treatment. Careful attention to the external indications, or what Laycock calls physiognomical diagnosis, will enable the practitioner to distinguish for himself by the eye many of the patients who are the subjects of lithiasis. Such knowledge, when acquired, will often light up the nature of a case otherwise most obscure, and give indications for successful treatment which would not, and could not, be furnished in any other way. Of course those who have not learned to see these indications do not see them, because, as the Italian painters say, "the eye can only see what it has learned to see;" it is, however, of much importance that the teaching of the eye in these matters be at once commenced, and the special education perseveringly pushed. The knowledge is well worth the trouble of acquiring.

Surmising that such knowledge exists, or is about to be acquired, by the reader, and that diagnostic power will enable

the observer to select his cases—the question of the treatment of them will next engage our attention.

Gout, as might be expected from its nature, manifests itself variously in different persons. The broad gouty persons suffer rather from arthritic gout, gouty disease of the heart, and eczema: who are usually free from dyspepsia, and nervous disorder of the heart; but who are certainly liable to bronchitis. The gouty man of thin flank is not so liable to articular gout; heart disease or bronchitis; but he is liable to nervous disturbances, skin troubles, and dyspepsia. Just as the external appearance, or physique differs, so does the form of their gout; and also the treatment of each. The massive solid gouty folk might be fitly spoken of as the "Norseman type"; while the slighter folk of highly-developed nervous system but lighter in the bone, might be classed as of the "Arab type." Of course there are hybrids or blends.

Before proceeding with the actual treatment of gout in practice, it may be useful to the reader to point out that gouty persons of the "Norseman" division tolerate alkalies well: while the "Arab" gouty folk do not bear them well. Also that the treatment of gout branches out in two directions. When the liver manifests a tendency to fall back, or revert to the formation of uric acid, the first thing to be done is to limit its labours as regards the metabolism of albuminoids. As regards this matter no two opinions can possibly exist. That belongs to all gouty persons, and forms the first procedure in the treatment.

Then comes the medicinal management of the case. This takes two sub-directions. (1) To get rid of the urates by rendering them soluble, so that the uric acid escapes readily in the urine. This can be done by the use of uric acid solvents, viz. lithia and potash. (2) To improve or raise the functional capacity of the liver. This can be done—to a greater or less extent certainly—by the steady perseverance with a combination of tonics and hepatic stimulants. A combination of strychnine and ipecacuanha, with taraxacum, euonymin, or iridin, and such carminative or laxative as the case may require, will in no long time produce an effect. The tendency to the formation of uric acid is lessened and the capacity to form urea

improved. Of course the two lines can be combined, and combined with advantage, in many cases.

But where the patient will not comply with the directions as to diet, which are the outcome of our knowledge of the genesis of gout or lithiasis, the medical treatment will scarcely be very successful.

With such broad rules to guide him the reader can profitably proceed to the matter of more special treatment of the different manifestations of gout.

§ 109. *Treatment of Lithiasis.*—This is a matter which is now much more simple than it was in the days of Sir Charles Scudamore, for instance; though his work is well worthy of perusal yet by those whose practice furnishes them with many cases of lithiasis, especially in its rarer manifestations. There is present in the fluids, and often too in the tissues, a distinct and well-known product of retrograde tissue-metamorphosis and of excess of peptones, viz. uric acid, possessing equally well-known properties. For some time before an outbreak of acute gout the amount of uric acid passed off by the kidneys is distinctly diminished: but it is still formed and retained in the body, especially in the blood. It saturates certain tissues, especially the articulations, and then, at intervals, ensues a condition of heightened temperature accompanied by severe pain. These acute conditions are rather the cure than the disease, however. The effect of the high temperature is to reduce the uric acid into urea and carbonic acid, and so to get rid of it; for the time being the joints are converted into supplementary kidneys. There is a process of oxidation going on in the tissues, which results in the perfect elimination of the morbid product and the restoration of the action of the joint in its integrity. Again and again will such inflammatory storms pass over a joint, leaving it unscathed and uninjured thereby. In time, however, distinct structural changes result. This consideration is an important matter in relation to treatment. Experience has long pronounced against repressive measures, having found them harmful and pernicious. The uric acid must be got rid of; and the more quickly the better, the more slowly the worse. The inflammatory action, the high temperature, and the increased amount of oxygen furnished in the highly vascular

condition, is really essential to such removal. Cold applications, though giving relief at the time, purchase it at the cost of future suffering. Local blood-letting, as by leeches, is still more reprehensible. It is not uncommon to see great toes stiffened after a few attacks, when local depletion has been resorted to. It is safe to warn those engaged in the treatment of an acutely inflamed gouty joint never to have resort to this mode of combating the disease. It would seem that the abstraction of blood from the joint allows or favours the free disposition of urate of sodium in the tissues, and thus the ligaments become rigid, and anchylosis results. How different is this from the practice requisite in an ordinary inflammation of a joint! There local bleeding and cold applications are most desirable; in gouty inflammation they are to be strenuously avoided.

The following external treatment of acute gout has been used with success. Take half an ounce of iodide of potassium, dissolve it in ten ounces of rectified spirit—methylated spirit is used in hospital practice—add one ounce of soap liniment, and then half a drachm each of oil of cajeput and oil of cloves. A piece of lint is soaked in this mixture, wrapped round the affected part, covered with protective, and kept in place by a bandage. It acts as a powerful counter-irritant, and the inflammation usually subsides in from twelve to twenty-four hours (Murrell, *Medico-Chirurgical Society*).

In acute gout the general treatment is of great importance. It is usual to commence with purgation of an active character. This gives relief to the general disturbance and lowers the pyrexia. For such purpose it is usual to resort to alkaline salines. If the tongue is laden, the secretions foul, and the liver congested, a pill containing mercury with vegetable aperients may be given at bed-time, and be followed by a sharp cathartic in the morning, as a black draught, a seidlitz powder, or a dose of mineral water. It is requisite, however, to be cautious about the use of mercurials; in chronic renal changes there is much intolerance of both mercury and opium except in very small doses. Consequently other sedatives are given in lieu of opium, and other cholagogues than mercury. The following is a good measure:—

Mag. Sulph. ℥ij.
Pot. Bicarb. gr. xv.
Tinc. Sem. Colchici, ♏x.
Inf. Buchu, ℥i.

every four or six hours. It should always be followed by a large draught of water, not too cold. After free catharsis is induced, then the sulphate of magnesium may be omitted in favour of a cathartic at intervals. The action of colchicum is a mystery yet. It does not increase the amount of solids in the urine, as has been thought: but it is agreed that it is most efficacious in the relief of acute paroxysms of gout. An impression is formed that colchicum arrests the active symptoms; but in so doing favours depositions in the joints. Really it appears to suppress the gout. Some people think that colchicum gives immediate relief, but its action is injurious to the patient's permanent interests. The potash renders the uric acid or the urates soluble, and so they can leave the inflamed parts and enter the blood-current. The buchu probably increases the excretion of the solids by the kidneys. The large doses of fluids help to wash the soluble matters out at the different emunctories in the excretion of water.

Such is the treatment of a gouty inflammation, whether in the articulations or elsewhere. It is the gout, not the local manifestation, that we have to treat: and consequently the measures most effectual against the gout are the most suitable, no matter what the part affected. Frequently it is desirable to use iodide of potassium, especially in the less acute forms of the attack. It seems to promote absorption from the tissues, and to make a wonderful difference in the progress of a case. The urine, which was very pale-coloured under the use of bicarbonate of potassium and colchicum, grows deeper coloured and has a stronger odour when the iodide is added; at the same time the symptoms are ameliorated. When the outbreak is but sub-acute, instead of the sulphate of magnesium in the above formula five grains of iodide of potassium may be advantageously substituted for it, and an occasional seidlitz powder given.

Of late years piperazine, which is a diethylene diamene obtained by the decomposition of the ethylene diamene by heat, has been

largely used in the treatment of acute and subacute gout. The piperazine hydrochloride is freely soluble in water. It is a solvent for uric acid, and forms neutral urates. Lycetal, which is the dimethyl-piperazine tartrate, is also a good solvent of uric acid and possesses marked diuretic properties.

The diet in acute gout should consist largely of warm fluids, as milk alone or with arrowroot, gruel, &c., and but small quantities of beef-tea. Milk and seltzer-water, Vichy, or Carlsbad water, should form the staple diet.

In subacute cases, stimulating the action of the skin by warm baths is desirable. This may be done in any of the inflammatory actions of acute gout. It is serviceable in gouty bronchitis, where the mixture of iodide of potassium, potash, and colchicum with senega is indicated. Gout is apt to linger in a subacute form, as well as to manifest itself primarily in the form of bronchitis. Here this formula :—

Pot. Iod. gr. v.
Pot. Bicarb. gr. x.
Mist. Ammoniaci, ʒi.

three times a day is very useful. Where the acidity is slight—as is found by testing the saliva with litmus paper—five grains of carbonate of ammonium may be substituted for the bicarbonate of potassium. Where there is a gouty dyspepsia the following mixture is indicated :—

Tinct. Nuc. Vom. ♏x.
Pot. Bicarb. gr. xv.
Inf. Calumbæ, ʒi.

three times a day before food, and followed by a draught of water.

In certain cases local applications are useful, as in the effusion which occurs in joints; and here the Viennese plan of combining tincture of nutgalls with tincture of iodine in equal parts, or the nutgalls preponderating, is capital. It gives much relief, and does not usually, indeed rarely, blisters, and thus the application can be continued. When the joints of the hand are thickened, iodide of potassium in soap liniment is useful. At other times there is an acute affection of the skin, usually

eczematous In such cases the use of alkaline lotions is indicated, and often gives great relief.

The question of soporifics in lithiasis, acute or chronic, is one of much practical importance. Opium and morphine, either by the mouth, rectum, or subcutaneously, are to be avoided, except in small doses. If there be much restlessness from the suffering in lithiasis, other remedies are indicated. These are hyoscyamus, cannabis indica, and tincture of hop. They may be combined with the mixture, or given at bed-time merely.

Pot. Brom. gr. xx.
Tinct. Hyoscyami, ℥ ss.
Tinct. Lupuli, ℥ i.
Mist. Camph. ℥i.

is a good draught at bed-time; or tincture of cannabis indica (fifteen drops) may be substituted for the hyoscyamus, and the dose increased if necessary. We have not improved much upon the measures of the past generation in finding a suitable hypnotic in gouty states, but trional and sulphonal combined are undoubtedly useful. Five or ten grains of each may be given in a little hot brandy-and-water on retiring to rest. Chloral hydrate is indicated when insomnia is found to be accompanied by a tense artery. Here the lowering of the blood-pressure is essential to sleep.

§ 110. In the more chronic forms of lithiasis, otherwise called latent or suppressed gout, our treatment varies no little with the patient presented to us. If he be a high-coloured, "old-Father-Christmas" sort of a man, with a strong pulse and a powerful heart, it will be desirable to administer potash freely, and to resort to steady action on the bowels by mineral waters. At the same time the amount of nitrogenized food consumed must be diminished, and fish without rich sauces substituted for it. The amount of generous wine and malt liquor must be looked to, and the consumption limited. If these measures produce much depression, as they are apt to do in stalwart men at times, the patient must keep quiet for a few days, until the more active part of the treatment is over. The treatment doubtless has some effect, but the withdrawal of the stimulating food and the supplies of alcohol have more. If the vascular

depression be marked, squills or digitalis may be given with the other remedial agents.

At other times there is a much less sthenic type of patient to deal with. Here it may be necessary after a brief course of pure alkalies to combine iron and potash, or even to give both with a little arsenic.

Liq. Arsenicalis, ℥v.
Pot. Bicarb. gr. v.
Ferri Pot. Tart. gr. v.
Inf. Quass. ℥i.

three times a day is a capital combination. If it irritates the stomach when given before meals, it may be given when digestion is well advanced, say two hours after a meal.

When gout is prominently atonic, it is sometimes very desirable to give cod-liver oil and good nutritive food along with alkalies and chalybeates. Very often indeed it is necessary so to proceed; the waste nitrogenized matters being met by the constant resort to alkaline waters and occasional purgation. Vals or Vichy water will often give excellent results in chronic and atonic conditions of lithiasis. When there is much debility in the heart, and the circulation is languid, digitalis or strophanthus in small doses may be given continuously with advantage. A residence at Aix-les-Bains, Vichy, Ems, Saratoga, and similar spas is often useful.

The treatment of lithiasis, in its pronounced and chronic forms, is a matter as complex as is the malady to be treated; and no written instructions can do more than point the direction in which the medical attendant must proceed, in order to think out for himself the treatment of each case. Many cases will often give much trouble, but will amply reward the practitioner for the trouble so taken. There is no more satisfactory practice than that afforded by the careful and honest study of the multitudinous and varied conditions assumed by lithiasis; not only to recognize them, but to treat them with a good knowledge of their nature, and to know how to vary the treatment to the exigencies of each case. The treatment of gout, founded on Cullen's aphorism of trusting to patience and flannel, is to be highly deprecated.

§ 111. *Rheumatic Gout.*—This is an affection whose nature is very obscure. The name would imply a hybrid betwixt gout and rheumatism. It is scarcely that, however; and no special product either of malassimilation or of histolysis, can be found in connection with it. If this is the case as to its pathology, we are at no loss as to the circumstances under which it manifests itself. It is the offspring of debility. It may show itself in a form of rheumatoid arthritis, first attacking one joint, then another, until the individual is most effectually crippled; or it may linger around and permanently attach itself to one joint in particular.

Under these circumstances it is a serious matter; and forms an obstinate and intractable malady. Very commonly, however, it forms a sequel to acute rheumatism in persons of strumous diathesis, or when the general health is impaired. When so associated it is chiefly confined to the small joints of the hands and feet. It also is found in the subjects of atonic gout, especially when they are placed under debilitating circumstances. Dr. Archibald E. Garrod thinks that we may adopt at least as a working hypothesis the view that the cases which we include under the name of Rheumatoid Arthritis are cases of trophic joint changes due to some disturbance of the central nervous system. He holds that such disturbances may be produced by a variety of causes, directly by mental anxiety or shock or by the action of damp, cold, or indirectly by uterine disorders or local injuries. In addition we may suppose that in those who inherit the arthritic diathesis such influences more readily lead to the production of joint lesions than in those who have no such hereditary tendency.

No matter how originated, it has ever to be met by measures calculated to improve the general health. Our great object throughout the treatment should be to restore or maintain the health of the system. There is a certain class of persons—persons of the strumous diathesis, usually—in whom, when the subjects of acute rheumatism, this aspect of matters may be anticipated; and then iron must be added to the alkalies employed at an early period, and the combination must be exhibited for several weeks. At the same time good food in liberal quantities, cod-liver oil, and sound malt liquors must be given.

Alcoholic beverages in moderation are harmless in rheumatic gout. Practically we may say that whatever kind of alcoholic beverage causes the patient to eat with most relish and digest with most comfort may be selected. When the case goes on, and cannot be arrested by these measures, it becomes desirable to resort to the iodide of iron, either the syrup, or Blancard's pills, or the combinations of arsenic and iron given in earlier sections of this work may be used instead. Fresh air, especially at the seaside, and other means of improving the general health, are useful. If the general health can be improved the local malady will be improved. As to the local measures to be used, iodide of potassium in soap liniment is the favourite method; or the iodide may be dissolved in glycerine, and then gently rubbed in. The question of motion in the affected joints is a complex one. Often gentle passive motion is highly desirable, at other times active motion may be permissible. The best rule in reference to motion is to desist from that amount which makes the part painful next day. If this rule is carefully adhered to no mischief will be done, and much good may often be effected.

Such are the constitutional or general diseases associated with assimilation and excretion. Frequently they are to a certain extent inherited, or more properly speaking, the tendency to them is transmitted by descent. At other times they may be acquired. Their progress too will often depend much upon the individual in whom they are found. It will tend to elucidate matters briefly to discuss in the next chapter the questions of inherited constitutions, or diatheses, and of acquired modifications or cachexiæ, as they are of the very greatest importance in practice, and ever give a direction to our remedial measures.

CHAPTER XII

DIATHESES AND CACHEXIÆ

§ 112. Great importance has ever been attached to that acquaintance with families and individuals which is summed up as "knowing their constitution." There is some ground for a sceptical doubt as to whether this form of knowledge has not at times been made a great mystery, and been utilized accordingly. Still nevertheless there is much in such knowledge when it exists—and that is very commonly. From long experience the medical attendant has learnt, slowly and by degrees, that there are certain tendencies in a family; that in their ailments certain peculiarities are apt to show themselves; that their convalescence is liable to modifications, and that they suffer from allied or recurrent disorders. Empirically he has recognized the necessity for certain methods of treatment to meet these family tendencies and idiosyncrasies; and learnt when and where to make a special movement to counteract a known modification in his patient, and by doing so to benefit him very much; in fact, often a life is thus preserved that under another practitioner, perhaps much better informed generally, but lacking this particular information about the patient and his family, would have been endangered. The widespread confidence in the old family practitioner is a proof of the existence of a belief in such special knowledge; and it is often of real importance to families when selecting a new medical attendant to feel assured that he will remain among them, and that the special knowledge acquired by long acquaintance with them shall be available as long as he shall live. When the medical attendant is a shrewd, clear-sighted man,

this experience is truly valuable; and even where these two adjectives can scarcely be applied to him, he always learns something which is not altogether without value. Granting that "a knowledge of the constitution" is an important matter, it becomes all the more necessary to have some means of acquiring information as to the peculiarities of a patient, when circumstances render a consultation necessary with a medical man who has no previous knowledge of the family, and the best must be made of the matter. If "the knowledge of the constitution" possessed by the family doctor were always as genuine an article as it is assumed to be, and did not quite so often confine itself to a thorough acquaintance with the mental peculiarities, each large and wealthy family would find it almost indispensable to have their medical attendant always with them. It is found, however, that such a practice is not necessary; and that a perfect stranger may be quite competent to undertake the management of their ailments and to conduct them to a successful issue. That is ordinarily; at other times it becomes highly desirable that the old family attendant be called in, no matter at what inconvenience, nor how able the medical man in charge of the case.

So truly important is this matter of recognizing the family or individual characteristics that systematic attempts to classify diatheses and cachexiæ, and to give the characteristics of each, have been made. There is no more valuable acquisition for a medical man than a fair acquaintance with the physiognomy of disease. The hue of anæmia; the facial œdema of chronic renal disease; the florid complexion of plethora; the nose of the drunkard: to say nothing of the cutaneous indications of the exanthemata, on which indeed their classification rests; are all well recognized, and their diagnostic utility admitted. Finer outward indications of internal changes reveal themselves to the watchful observer; and when years of close attention have developed the faculties, the knowledge acquired by a careful observation of the patient is sometimes almost incredible. Of course what becomes obvious enough to the eye so trained may remain unseen, and therefore incomprehensible, to the eye which has not yet learnt so to see. The negative evidence thus furnished by ignorance weighs but little in the scales

compared with a little positive evidence. Very often indeed the youthful reader will find himself brought face to face with sick persons of whom he knows nothing and from whom he can learn nothing: say, for instance, when called in to a case of uræmic coma: and yet it is highly desirable that he should make a diagnosis, and if possible distinguish this form of unconsciousness from other similar conditions. Highly important indeed as regards the line of treatment. If he has paid some attention, so far indeed as his opportunities will permit, to physiognomical diagnosis, suspicions will flit across his mental horizon as to the possibility of the causation of the unconsciousness; and a microscopic slide moistened with hydrochloric acid held under the patient's nose will usually render the diagnosis clearer; when he has time to put it under the microscope, then crystals of hydrochlorate of ammonia, characteristic and distinct, will clear up the matter. But very probably slides and hydrochloric acid, to say nothing of microscopes, are not among the armamentaria of his ordinary walk; so he must forego this evidence, and act upon what is revealed to the unaided senses. If those senses are uncultivated they will not tell much; if they have been sedulously educated they will give most valuable indications: in Professor Laycock's case there was something almost wizard-like about his powers of diagnosis from external indications merely, and no pupil of his questions his remarkable ability in this direction. He himself writes:—"Study well the physiognomy of disease—that is to say, all those external characteristics in the patient that reach the unaided senses, and which are associated with morbid states, whether they be sounds or odours, or visible and tangible modifications of form, complexion, expression, and modes of functional activity; taking cognizance of minute modifications as well as of the more obvious, for they are only minute in a popular sense. Technically, a shade of tint of the skin, a quickly passing change in the expression, an almost imperceptible modification in the breathing or mode of speaking, the ring of a cough, a local and in itself trivial development of a capillary network, a slight twitching of a muscle, or a tremor, may be as clearly significant of structural disease as the most characteristic and undoubted physical signs." By

such education, persevered in for years, the eye becomes enabled to assist, or even to direct the physical examination in a wonderful manner. It is often of itself sufficient to exclude a large number of sources of error, and to give a valuable clue to the right direction in which to go. In chlorosis, for instance, the eye makes the diagnosis; and with it embraces the pathological conditions existing, and sketches out the line of treatment to be pursued. A limited number of questions as to certain minor but not unimportant points is amply sufficient to complete the survey; and physical examination as to hæmic murmurs and *bruits de diable* rarely gives anything but corroborative information.

The application of such trained vision to the question of the outward indications of inherited peculiarities has revealed groups of diatheses, distinct and characteristic; each possessing characters and tendencies of its own, well worthy of the careful study of the medical observer. By painstaking observation of these matters, as a general rule of practice, and quick application of the knowledge to each individual case, together with a searching examination into the family history, an approach can often be made to that knowledge of the family constitution which has been supposed to be the peculiar property of the family attendant alone. In fact very often such investigation will reveal much that the doctor never thoroughly comprehended, and lighten up much that hitherto has lain in comparatively unillumined darkness. Such being the case, it is eminently desirable that all students of medicine should for their own sakes, as well as their patients', familiarize themselves with those external indications which are characteristic of constitutional conditions; or in other words, of those inherited peculiarities which, grouped together, form the diatheses. This knowledge is ever at hand, and can neither be forgotten at home, nor found out of order on an emergency. It will endow its possessor with information that is otherwise unattainable, and will often strengthen his hands very materially.

§ 113. Diatheses may be divided into five large groups, which may be found either as typical forms, or in every stage of blending. These five forms are, (1) the gouty, (2) the nervous, (3) the strumous, (4) the bilious, and (5) the lymphatic. Very

frequently persons are to be found who are distinct and typical instances of each form; while in other cases there is one diathesis forming as it were the foundation, and another superimposed upon it; for instance, the nervous or the strumous often possess gouty characteristics. At other times the diathesis will determine the direction of a general cachexia. In those of a nervous diathesis lithiasis will commonly manifest itself in nervous affections, and especially so in the neuralgiæ of advanced life. In the bilious person a cold will be apt to induce biliary disorder, even to catarrh of the bile-ducts. The strumous are liable to glandular troubles, and their articulations are apt to become the seat of disease from slight provoking causes. To be able indeed to recognize the strumous diathesis when called in to an apparently trifling injury of a joint, is often to be enabled to guard against an otherwise most erroneous prognosis; and further to take proper measures for the successful treatment of the subsequent changes which will in all probability follow the immediate consequences of the injury. In the bilious it is commonly advantageous to attend specially to the liver in any form of disorder or ill-health which may occur in persons of this diathesis. The lymphatic are especially liable to low forms of adynamic ailments, are listless, and unenergetic; and very commonly require a pronouncedly stimulant line of treatment.

Some description of each form of diathesis is now desirable, and in each case the typical form will be delineated—the crossings and blendings cannot be followed out here; and the reader must learn to decipher such forms for himself from his acquaintance with the several component parts.

§ 114. *The Gouty Diathesis.*—Persons of this diathesis are commonly well made, with a tendency to breadth. The osseous and muscular systems are well developed: the teeth are even, well-shaped, and remain "undecayed in advanced life." The large, massive, heavily-enamelled front teeth of the gouty will often give a direction to the diagnosis of the greatest service, as well as suggestions as to the treatment to be adopted in many cases. The vascular system is highly developed, the vessels are numerous, and the heart strong and large. The nervous system is very stable, and not easily disordered. The digestive powers are very good, and the reproductive powers are

active. They are usually healthy persons until the changes of advanced life become pronounced. This class furnishes those hale individuals who at sixty years of age can boast that they never took a dose of medicine in their lives. Nevertheless in advanced life they are apt to have some acute ailment which either carries them off somewhat unexpectedly, or leaves them in a much impaired general condition.

In persons of this diathesis affections usually assume a sthenic type: lowering measures are generally indicated early in the ailment, and in convalescence the recuperative powers are usually active. In acute ailments depressants are commonly indicated, and the vascular tension is usually high, and the pulse incompressible. Purgation by alkaline salines, low diet, and slops are the measures best suited to these individuals. When advanced in years they become more liable to ailments than they are in early life and in maturity; they are the subjects of lithiasis in its varied forms, and whatever their ailment its probable association with uric acid must never be forgotten. Even if the malady has a distinctly separate origin, the diathesis is apt to modify it, and by so modifying the functional activity of the part to maintain the ailment in a chronic form, especially if it be situated on an eliminating surface. All that has been said from time to time before about lithiasis applies with much fitness to persons of this diathesis.

§ 115. *The Nervous Diathesis.*—Persons of this diathesis are rarely of great bulk. Their osseous framework is small, but well proportioned; their muscles are not large, but they possess more power than the mere size would indicate. Usually such people are small, active, restless, and unwearying. Their skulls are well formed, and at times comparatively large and well vaulted; and the development of the nervous system exceeds that of any other part. Their senses are usually acute, and they are indefatigable and energetic. They always seem able to do something more than they are doing, no matter how heavy their duties; in any emergency they are usually prominent, and not only are active themselves, but inspire others to exertion. Very frequently they require but few hours of sleep; and usually they can thoroughly overwork themselves without having resort to stimulants. In them the highly-developed nervous system

tyrannizes over the body in reiterated demands: while the chylopoietic viscera are not rarely unequal to supplying the calls upon the nutritive processes. Tea is their favourite stimulant. In persons of this diathesis rest and sedatives, or tonics, are chiefly indicated in their maladies, which are largely associated with over-exertion. Some of them are singularly susceptible to small doses of narcotics; while others again require unusually large doses to produce the wonted effect. This class too furnishes a large number of the persons who display what are called "idiosyncrasies," and who are consequently a very difficult class of people to treat, and constantly defeat the most carefully laid therapeutic schemes by their peculiarities. There is no class of beings about whom it behoves the young practitioner to be more cautious: the more so that they are apt to preserve a singularly clear remembrance of everything, mistakes as well as hits, and are therefore either good friends or awkward enemies of the practitioner. This diathesis is commonly found blended with others—except the lymphatic, which is its antithesis. It is found not rarely with the bilious, and very frequently with the gouty; but most largely with the strumous. Whenever it exists it gives a direction to maladies. It furnishes, according to Laycock, predisposition to insanity, anomalous hysteria, to eccentricity, to vinomania, to epilepsy, and to chorea. Usually persons of this diathesis prefer tea to alcohol; but if once drinking habits become formed, they grow, and many of the most hopeless inveterate drinkers are furnished by members of this group. In practice the recognition of a nervous element in the constitution is a great step towards appropriate and successful treatment.

§ 116. *The Strumous Diathesis.*—Under the name of scrofula, with its numerous modifications, this diathesis has long been recognized and its importance appraised in the treatment of disease. In such persons the vitality is weak. The circulation is defective and liable to disturbance. Assimilation is imperfect, and nutrition is deficient. The osseous system is far from being highly developed, and it is of a retrogressive type, either towards the infantile or a lower ethnic form, both as to cranium and other bones. The epiphyses are often excessively large in the young, and are specially liable to disease.

Even when healthy there is a tendency in these epiphyses to be large and unsightly in adult life; especially is this the case with the small joints of the hands and feet. Very frequently the extremities contrast strongly with the *petite* and beautiful features found in the strumous. In consequence of the imperfect osseous development it is rare to find a thoroughly well-shaped thorax in persons of this diathesis; the chest is apt to be flat, the ribs are drawn downwards in inspiration; and the configuration is one that one learns to dread, as being so closely associated with the development of tubercle, whenever there is any inflammatory action going on in the thorax. The muscles are usually soft, and contract without energy except when this diathesis is blended with the nervous. The functions of organic life are far from active. The appetite is capricious, and the assimilation, especially of fatty matters, is defective. Circulation and respiration are feeble; they are prone to precocity, while the nervous system is irritable, and is often imperfectly developed, and if the mental powers are good they are usually easily exhausted. This diathesis furnishes those children who are too good to live, the bright precocious little angels described in Chapter VII. Most of the troubles, especially of the chronic troubles of infancy and of growth, are furnished by the tendencies of this diathesis. Any blow to a joint is apt to be followed by arthritis, not rarely of a suppurative character. The exanthems, though perhaps less severe at the time, are extremely liable to be followed by low chronic maladies of an intractable character. Persons of this diathesis are commonly the subjects of rheumatic arthritis after an attack of acute rheumatism unless the greatest care is exercised; and iron, iodine, cod-liver oil, nutritive food, good air, and all other preventive measures must be adopted. Indeed the recognition of this diathesis is of more importance than that of any other form in actual practice. The injured joint, which in another person would merely require a cooling lotion and temporary rest for its repair, will, in persons of this diathesis, demand prolonged rest in splints; together with all the measures mentioned in the sentence immediately above. Even with all care an imperfect repair alone is often all that is practicable. If these persons have any mischief in their thorax it is very apt to assume a tuberculous character, instead of undergoing normal

resolution. It is from them that the recruits of the ranks of the consumptive are largely drawn. In infancy the glands of the chylopoietic viscera are apt to become diseased, while inflammatory affections of the serous membranes are common, and also assume a tubercular form. There is a persistent tendency to set up lowly forms of cell-growth, which call for energetic and sustained treatment. Indeed the majority of the chronic diseases of early life is furnished by individuals of a strumous diathesis. There is a marked inclination to the formation of uric acid; and vesical calculus is the not infrequent result. It is in the families of this diathesis that syphilis mostly shows itself as a congenital affection, and produces those modifications which are recognized as the syphilo-strumous diathesis. In fact where there is a strumous diathesis the tendency to degeneration in every form is marked and decided. A gouty inflammation in a man who has scrofula by inheritance may drift into true scrofulous inflammation. It may be doubted whether syphilis implanted in any other than a tuberculous or scrofulous person will ever produce destructive ulceration of the soft parts of the nose. When they are the subjects of syphilis they are very liable to have growths of a lowly form of cell life in their lungs, little removed from tubercle histologically; in other parts these growths are known as gummata or syphilitic tumours. One curious matter illustrating the imperfect nutrition which goes along with the strumous diathesis is this, the formation of tubercle is commonly in abeyance during pregnancy —a period of amplified nutrition. Another matter of moment is that an organism with but a slight tendency to struma, if placed under unfavourable circumstances, will give birth to children in which this diathesis is pronounced; and in a similar way the process may be reversed by placing the strumous under more favourable circumstances. Struma grows up in town-bred families, and Lugol asserts that scrofula was rampant in the third generation of those who entered Paris as perfectly healthy provincials. There is a tendency to variation in every organism, and when placed amidst unfavourable surroundings, especially if, at the same time, there be any insufficiency of food, the modification so induced is towards the type termed strumous.

From what has just been said, it is abundantly demonstrated

that in persons of the strumous diathesis the thing to aim at, in their ailments, is to keep up and improve the nutrition; and to obviate the tendency to chronic disease, with exuberant growth of lowly forms of cell life—no matter what the form of ailment, or wherever seated.

§ 117. *The Bilious Diathesis.*—This is not quite so much a distinct type as the forms we have just been considering, but is often rather a modification found along with one of the former. It consists essentially in a tendency towards biliary disturbances from causes which would in others be regarded as slight. It is not yet possible to say why this is, whether or not it is an excessive production of bile; but certain it is, bilious persons are not usually inclined to be corpulent, though that is by no means a rule absolute. These persons often grow stout when they cease to be bilious. It would seem that there is some antagonism between biliousness and the deposition of hydro-carbons as fat. There is a dark complexion usually in persons of this diathesis, and the skin lacks transparency. When engrafted on the typical gouty diathesis, the product is a large, tall, energetic individual of a somewhat gloomy temperament. These individuals are by some writers classed as energetic forms of the lymphatic diathesis, which implies a contradiction as marked as if one were to speak of listless individuals of the nervous diathesis. At other times it is found along with the nervous diathesis, and then we have the small, dark, active beings with whom we are all familiar. Very commonly it is found associated with struma; and of all strumous persons, who go steadily and swiftly downwards under tuberculosis, the bilio-strumous are the most marked. Whenever tubercle shows itself in uncommonly dark persons with jet-black hair, very marked eyebrows and long black eyelashes, it will run its course speedily; in a manner much resembling its career in the dark races. Whether it is that the bilious tendency interferes with that assimilation of fat and other hydro-carbons so desirable and even necessary to the strumous, when tubercle is threatening or not, it is impossible to say. Nevertheless the fact remains. This diathesis may also be blended with the next form—the lymphatic.

In all maladies in the bilious, attention must be paid to the functions of the liver, and a good discharge of bile into the

bowels is desirable. Alkaline purgatives are usually advisable, and they may be combined with rhubarb and aloes with advantage. Such medication is more or less necessary in all maladies in the bilious, especially when it becomes desirable to improve the general nutrition. Bilious persons can assimilate more nutrition, and more thoroughly too, if they are kept on liberal supplies of food combined with purgation, than if they attempt to avoid biliousness by starvation. This should never be forgotten in the treatment of persons of a bilious diathesis. There is a large amount of waste in their furnace, no matter how small the quantity of fuel; and the only effective plan of treatment is to keep the flues swept, and at the same time to be liberal with the fuel.

Whenever the bilious diathesis is found combined with another diathesis, the treatment of it must be blended with the treatment of the associated diathesis. To recognize such combination in practice and in the selection of remedial agents is often more practically useful than an elaborate physical diagnosis; and is especially useful where physical diagnosis is not readily attainable.

§ 118. *The Lymphatic Diathesis.*—This is the last of the forms of true diathesis. It gives large, unenergetic, phlegmatic and listless persons. It is the exact antithesis of the nervous diathesis. It is most commonly found in women. It gives a marked tendency to passive hæmorrhages, especially uterine. Such women suffer from chronic menorrhagia, associated with persistent leucorrhœa, and they usually have heavy losses of blood after each parturition; it is not flooding, but a draining loss analogous to the bleeding in the hæmorrhagic cachexia. They also often have large supplies of lacteal fluid, but it is of indifferent character. They do not make good wet nurses, though to the eye apparently admirably adapted for that purpose. All their secretions are free, and the use of astringents is often indicated in the treatment of ailments in persons of this diathesis. They are liable to suffer from dilatation of the heart, with palpitation, especially about the menopause; and are most difficult patients to treat satisfactorily. These large, unenergetic beings of either sex require active treatment in their maladies, and especially active stimulant

treatment, without which, if they do recover, they are liable to make a slow and unsatisfactory convalescence; and are very subject to remain invalids for a long time, with some low form of chronic ailment, or with general adynamy. Depressants are rarely indicated with them. These persons are much affected by locality; in low-lying districts they are scarcely ever well; in high-lying, bracing localities, they are much better. This is especially seen where the lymphatic diathesis is blended with the bilious. Persons of the lymphatic diathesis are often said to be good-natured, when they might with equal truth be described as indolent; if listless, however, they are not capricious, and often furnish the steadfast, unwavering friend. There is one type of the lymphatic diathesis which is most troublesome in practice. The patient is usually a woman, broad-faced and corpulent, and not really pallid; there is a large development of fat over the abdomen, and a tendency to flatulence, and almost always some uterine affection is present, either hypertrophy or misplacement, with menorrhagia and leucorrhœa. They are chronic invalids, who complain much, probably not without reason; they are always grateful for what is done but they never improve much. Change of air at a chalybeate spa is worth trying.

§ 119. Such are the leading classes of diathesis. They constitute distinct groups of individuals, and, perhaps less often, pronounced groups of families. In some cases the family presents a very marked type of one or other diathesis. At times the type is not so pronounced in some members of the family as in others; while occasionally one individual will differ considerably from all the rest. When the tendency towards a certain diathesis lurks in both parents it will come out very strongly in their offspring. In this lies the sting of intermarriages. It is undesirable that two persons of like diathesis should marry; and especially is this true of the strumous.

There are few things of more importance in actual practice than a fairly good appreciation of the varieties of diathesis, and of the tendencies given by each; together with a knowledge of the therapeutic indications so furnished.

To the above list of diatheses some add the *hæmorrhagic* diathesis, classed by Laycock as a cachexia. It really may be

found along with any diathesis, single or blended. It consists in a tendency to passive hæmorrhage, which may render the most trivial wound a very grave matter. It gives no outward indications of its existence, and is only found out empirically. Whenever it is discovered, it then behoves the individual to be constantly on guard against any solution of tissue-continuity; and it also puts the medical man on the *qui vive* in any surgical interference. Usually the hæmorrhage is not arrested until the system is blanched and the blood-pressure brought very low; and, at the same time, until some very energetic measures for the repression of the bleeding have been resorted to.

Cachexiæ.

§ 120. Allied to diatheses in their modifying power over the constitution, and in their tendency to give a direction to maladies, stand the cachexiæ. A cachexia is an acquired modification, as compared to a diathesis, which is inherited or congenital. Or the two conditions may be combined, as in gout, for instance, where we have both a gouty diathesis and a gouty cachexia. The gouty cachexia may, however, be found along with any form of diathesis. Wherever a cachexia is found it behoves us, as practitioners, to attend to its indications. Syphilis also may exist either as an acquired cachexia, or an inherited diathesis: in either case its presence is most important in a therapeutic sense. Hitherto little allusion has been made to syphilis, but now it must engage our attention. Other cachexiæ, as the malarious cachexia and the cancerous cachexia, have been considered from time to time in other sections; now it is the turn of syphillis to become prominent—as the most striking illustration of a cachexia.

A cachexia, as said above, is an acquired modification of the constitution which may or may not be outwardly apparent. Except, indeed, in the anæmia which is so frequent in the course of cachexiæ, there are no pathognomonic indications. The modifications may be most profound, however, and may exercise a distinct influence over the most trivial as well as the most important maladies. Its presence is indicated rather by such effects than by visible signs. Syphilis, as just said, may

be either acquired or inherited. It is the effect of an animal poison, usually communicated by sexual intercourse. Its origin is shrouded in mystery which no application of intellectual enegy has yet been able to penetrate. It at first shows itself by a local ailment, usually a hard chancre. The soft chancre, so called, terminating in inguinal bubo, may be pretty well excluded from the present inquiry. Though at times it develops a hard base, when it is followed by constitutional manifestations. This local sore is characterized by a hard cartilaginous base. Within a few weeks ordinarily there follow general evidences of constitutional infection. There is ulceration of the throat, together with characteristic copper-coloured eruptions on the skin, sooner or later becoming scaly; while the hair usually falls off, but grows again. In some instances the poison seems to be eliminated by this eruption, usually termed "secondaries," and no other evil consequences follow. More commonly, however, another series of ailments sooner or later show themselves, which are termed "tertiaries." These are very commonly osteal or periosteal affections, but not rarely the nervous system is the seat of disease, usually a neoplasm or growth of connective tissue in the neuroglia, which affects the nervous tissue by its pressure; or new growths (gummata) may form in the muscles. Rheumatism, paralysis, cutaneous ulcerations of an eczematous, or of a serpiginous character, as well as conditions of profound anæmia, are the direct outcomes of syphilitic infection in its remoter manifestations.

Wherever an ailment can be discovered to have a syphilitic origin, it is our duty to treat the cachexia in the first place; and to relegate the local mischief to a subordinate place in the remedial measures. Empiricism has declared in clear and unmistakable accents that it is useless to treat syphilitic sequelæ without directly treating the syphilis. Chlorate of potassium and cinchona gargles are all very well in the pharyngeal ulceration of secondary syphilis, but they are not curative; while a mercurial course is. Tar ointment may palliate the syphilidæ, but it is inadequate to their cure. Hæmatics are indicated in the treatment of anæmia; but in the syphilitic cachexia mercury must be added to the chalybeate, if it has to be truly effective. The Zittmann treatment of syphilis consists

in keeping the patient in a room at a temperature of 80 F. and administering certain medicines according to a prescribed rate. The course lasts only a fortnight; but during that time the patient is strictly dieted. Zittmann's Decoction, No. I., contains sarsaparilla, aniseed, fennel, senna, and liquorice, together with subchloride of mercury and cinnabar. The milder decoction, No. II., is made from the residue of No. I., with the addition of more sarsaparilla, lemon, cardamoms, and liquorice. The pills are made as follows:—

℞. Hydrarg. Subchlor. gr. ij.
Ext. Coloc. Co. gr. v.
Ext. Hyoscyami, gr. ij.
ft. pil. ij. Sign: "The Pills."

The decoctions contain only a very small percentage of mercury, and it is doubtful if there is any particular advantage in following the extremely complicated directions laid down for the preparation. Taking the compound decoction of sarsaparilla as a basis, any intelligent practitioner could write a formula for a prescription which would answer the purpose equally well. Whenever and wherever it manifests itself, syphilis must be treated by its specific measures; modifications and additions, however, being made according to circumstances and the exigencies of each case. The specific remedies of syphilis are mercury, in all its forms, and iodine. How these agents act we do not yet truly know.

§ 121. That they do act, and most efficiently too, is admitted by the most confirmed sceptics; and their remedial power no competent authority would think of disputing. Though we do not yet know how they produce their effect, we know empirically how to apply them. In the earlier manifestations of syphilis mercury is the chief agent employed, either in continuous small doses by the mouth, or by repeated inunctions. For the first it is desirable to select some soluble solution of mercury, as the solution of the bichloride, or of the biniodide; for the latter blue ointment is preferred. There is one fact which will soon strike the most careless observer, and that is the protection against the evil effects of mercury which syphilis confers upon the system. Doses of mercury which would assuredly produce

havoc in other systems, are not only tolerated by the subjects of syphilis, but seem positively to do great good. Under them rashes disappear, ulcerations heal up, paralyses pass off, and morbid growths melt away. No matter what the malady, from rheumatic, nocturnal, persistent pains, to masses of lymph on the irides, it yields to mercury. It has been laid down as a general rule that syphilitic growths need mercury, while syphilitic ulcerations require rather iodide of potassium in full doses. This may be a good general rule, but it is not uncommon to see undoubted cases of syphilitic ulceration, in which full doses of iodide of potassium exert but little influence, and yet clear up after the administration of mercury combined with iron. Many cases of anæmia, which are entirely unaffected by chalybeates, at once begin to improve on the addition of mercury. In these cases there is evidence of the presence of syphilis, inherited or acquired. It has now become a regular practice to give mercury in cases of anæmia or imperfect evolution associated with syphilis. Not rarely, if the nutrition is very imperfect, cod-liver oil may be given at the same time with advantage. It is not unusual to see the subjects of syphilis commence to fatten under a mercurial course without any chalybeate remedy being exhibited. As soon as the syphilitic virus is met and neutralized by the mercury the processes of nutrition begin to improve forthwith. At other times it is desirable to meet the original disease by mercury, and the marasmus or anæmia by iron.

The combination which seems most generally serviceable is the following:—

℞ Liq. Hyd. Perchlor. ♏xxv.
Tinct. Fer. Perchlor. ♏x.
Inf. Quass. ℥i. ter in die.

It may be given before or after food, according as it is desirable or not, to give a filip to the appetite. It may be continued steadily for months not only without ill effect, but with advantage. By such combination we secure the good effects of a mercurial course; and yet protect the system from the effects of the mercury itself. While it is quite true that patients do sometimes fatten under mercurials given alone, it more com-

monly happens that some of the ill effects of a mercurial course manifest themselves sooner or later. The administration of a chalybeate along with the mercury obviates these evil consequences, and while the mercurial is engaging the syphilis, the iron supports the blood-formation, and protects the system against the evil consequences of the mercurial. At other times it is desirable to give the mercury in the form of pill, especially when the bowels are somewhat constipated. Every one must have noticed again and again how much better the calomel and colocynth pill has agreed with anæmic women than a pill not containing mercury. Rheumatism ordinarily does not require mercury for its successful treatment; but when it occurs in subjects not of a rheumatic character, is nocturnal, and is found among the collar-bones, in the upper arm, and in the shins, then mercury at once is beneficial; for this form of rheumatism is a syphilitic affection of the periosteum, usually worst at nights on getting warm in bed.

Whenever, too, hemiplegia occurs in young and healthy subjects, or any symptoms of interference with a nerve tract, the more irregular the better, show themselves, the syphilitic nature of the malady at once is suggested; and under appropriate treatment the most apparently formidable maladies pass away. This is a point of much importance for the young practitioner, and he should ever bear in mind the nervous affections produced by syphilis; by so doing he may not only save himself from falling into error, but he may be enabled to be of much service to patients whose ailments have hitherto not been properly comprehended, and so to gain much *kudos* for himself.

In children, where syphilis is congenital, as shown by affections of the nasal bones with "snuffles," or skin affections, especially copper-coloured nates, mercury, chiefly in the form of grey powder, has been found most serviceable. Here again we get a capital illustration of how important is the constitutional condition, and how comparatively insignificant the local ailment when syphilis underlies the ostensible malady. When children, whose teeth indicate the taint they suffer from, are anæmic, stunted, or arrested in their evolution, the addition of mercury to the ordinary measures will produce all the difference possible,

and convert an eminently unsatisfactory treatment into a very gratifying one.

It is no part of our business here to teach the reader how to distinguish syphilis in its thousand varied forms: that he must learn by the sweat of his brow; but in telling him by what principles he must conduct its treatment, it may not be out of place to insist that the diagnosis of syphilis must rest but little, if at all, upon any statements of the patient, and in no way upon the position in life of the sufferer. If these influences exist, the vision will often be clouded to the prejudice of the remedial measures. The coppery tint of a rash, or the serpiginous nature of the ulceration, must outweigh the bluest blood of the most perfect walks in life; in comparison with such witnesses the noblest descent and the most far-reaching of genealogies are trifles light as air. The austere life of an archbishop or a cardinal is not incompatible with early self-indulgence, with its consequences. Such being the case, it must never be forgotten that the purest and best of women may be the unwitting and unfortunate sharers of the taint. The inexorable laws of Nature know nothing of extenuating circumstances; and syphilis may be the lot of a princeling as well as of a pauper's bantling. Hebra is right in insisting that the diagnosis of syphilis shall rest upon its objective phenomena alone, and that the question of past history must be excluded—if we wish to be correct. The importance of a right diagnosis is made all the more manifest from what has just been said about the necessity for treating the cachexia irrespective of the form of the leading outward manifestation. There is one point about syphilis which has not attracted the attention it deserves, viz. the occurrence of acute outbursts of syphilis. Like gout and malaria, syphilis may be long quiescent, and then suddenly burst out. During these acute manifestations the syphilis must be actively treated; just as in the other cases the gout or the ague are treated.

§ 122. *Lead-Poisoning.*—Still more vividly even is the importance of the cachexia in proportion to the local malady brought out in the case of lead-poisoning. Once the diagnosis made, then it is of small moment what the peculiar manifestation of the poison; the treatment is the same. In lead

paralysis the muscles of the ball of the thumb waste, and in severe cases the deltoid and even the muscles of the neck and trunk are similarly affected. General paralysis may occur. As a rule there is only loss of motor power, but there may be loss of sensation. Swellings of an oval or elongated shape frequently form on the tendons at the back of the wrist, contrasting prominently with the atrophied muscles. The muscles *post-mortem* are found to be greyish-red in colour, or whitish and tough with considerable increase in the interstitial connective tissue. The origin of the disease is probably in the spinal cord, and is due to hyperæmia and proliferation of the neuroglia with consequent contraction causing degeneration of the cellular elements. Of the cerebral phenomena to which the term *saturnine encephalopathies* has been applied, epileptiform convulsions are the most common. They are usually preceded by intense headache, vertigo, and dimness of vision. They may occur early in the disease, and come on quite suddenly and without warning. The convulsions which ensue later, are associated with an albuminous condition of the urine, and are probably due to anæmia. No matter whether it be the well-known colicky pains, the wrist-drop, or paralysis of the extensors of the wrist; or the less-known forms of cerebral disorder, general tremor, amaurosis, albuminuria, or even of uterine disorder; if the blue lines on the edge of the gums be present the diagnosis of lead-poisoning is rendered probable. "The blue line is observed at the edge of the gums where they join the teeth. It is one of the first symptoms to appear, and the slowest to disappear. It is always most marked opposite the incisors. It is absent when there are no teeth, and is most marked in people who fail to clean their teeth. Sometimes it extends to the whole of the gums, and even to the contiguous portions of the cheek. It is produced by the sulphuretted-hydrogen developed from the tartar of the teeth penetrating the gums and forming a black sulphide with the lead" (Murrell's *Pharmacology and Therapeutics*). In lead cachexia the past history is valid and valuable; here there is nothing calling for concealment, and it may fairly be admitted as evidence. If the association of the malady can be clearly traced, and there has been contact with lead, then it behoves us to treat the cachexia. One plan much in vogue

is the administration of sulphuric acid in order to form in the system the insoluble, and therefore inert, sulphate of lead. The acid is usually given along with the sulphate of magnesium either with syrup, or in some bitter infusion. This forms a common draught in manufactories where lead is much used. The more favourite plan in medical practice is to dissolve the lead out of the body by giving iodide of potassium. This forms a combination with the lead, and the resultant, iodide of lead passes out of the body in solution, chiefly by the kidneys. It is desirable to combine with it a course of purgation. Very commonly attacks of gout, of various forms, are due to the action of lead, which appears to arrest the elimination of uric acid. But the form of malady matters little; it is the cachexia —the lead-poisoning, that we have to treat. The importance of recognizing a cachexia when present, no matter whether syphilitic, lead, or other poisoning, gouty, strumous, malarial, &c., can but be imperfectly conveyed by words; the student must observe it for himself in practice. All that can be done here is to sketch out the matter in outline, and leave it to be filled up as experience dictates. It is not, however, a trivial matter to sketch that outline correctly; and the sketch is as correct—it is hoped—as it can, in the present state of our knowledge, be made.

CHAPTER XIII

ACTION AND INACTION

§ 123. In this chapter will be considered the various measures by which we act upon the nervous system, and the means by which we can control that system, or excite action in it, when it becomes desirable to do so. That we possess such agents is familiar to every one; but how they exert their influence, how they produce their action, or in other words, their *modus operandi*, is not so clear. Physiological research and experimentation are doing much to dissipate the darkness which has hitherto shrouded this subject. Of the agents which control nerve-action we have several classes, as sedatives, depresso-motors, analgesics, anti-spasmodics, and agents which check secretion. The different members of these groups possess varying degrees of potency. The action of some is very pronounced, while others again are useful rather as adjuncts to the more powerful members. Of the neurotic agents which diminish action in the nervous system, opium, chloral hydrate, and bromide of potassium are the chief in common use: calabar bean, conium, and others are potent, but not so commonly resorted to; while hyoscyamus and camphor are less powerful, and are chiefly used as adjuncts to other remedies. Another class of agents, as belladonna and cannabis indica, lie across the borderland of depressant and excitant neurotics, and had best be considered under the latter heading. Even opium is not free from excitant properties, which counterbalance and even preponderate over its sedative properties, with some individuals. Much depends, too, upon the manner in which it is given; if administered in frequently repeated but small doses its excitant properties are brought out; if given

in full doses its sedative action is most pronounced. By habit and long indulgence in it opium may be converted into a nearly pure excitant, as in the well-known instance of De Quincey.

This combination of properties in a drug of so pronounced a character as opium demonstrates how difficult it is to form any arrangement or classification of neurotic agents which shall not at some point or other clash with acknowledged facts. In the present state of our knowledge a strictly accurate classification is unattainable: still it is possible to adopt an arrangement which will so group neurotic agents as to make their action somewhat clearer than before, and, to a great extent, to elucidate their use in actual practice.

In order to clear up this complex subject, to some extent at least, it may be as well to commence by reviewing a few of the leading facts already gathered, in reference to the recognized action of certain neurotic agents which control nerve activity.

§ 124. Opium first claims our attention. The effect of a moderate dose of opium, in ordinary individuals, is to induce sleep after a brief period of excitation. Max Schuler found that opium first produced a slight dilatation of the vessels of the pia mater, followed by contraction and brain-collapse; the vessels recovering their calibre, with slight dilatation even, when the narcosis was over. If a larger dose be given a death-like coma is produced, with a fast, feeble pulse, and irregular respirations. If the dose be fatal, death occurs generally by failure of the respiration, but amid an almost complete extinguishment of the vital functions. The action which in moderate doses controls and diminishes nervous action, in lethal doses abolishes functional activity in the nervous system. First, the higher cerebral faculties are acted upon; leaving the lower, but, as regards mere life, more vitally important centres at the base of the brain, but little affected. In larger doses these, too, are involved; and respiration and circulation are arrested, causing the death of the organism.

One of the difficulties experienced in attempting to trace out the action of opium upon the nervous system has arisen from the fact that in frogs opium excites convulsions. This is accounted for by the comparatively high development of the spinal cord in frogs and the imperfect evolution of the cerebrum; while

in man the cerebrum attains its highest development. Consequently in the frog the effect is to produce convulsions, chiefly the result of excited reflex irritability; while in man the resultant phenomena are sleep and stupor, the evidences of the effect upon the cerebrum. Opium, however, acts upon the spinal cord of man, as seen in its influence upon the centres which regulate the emptying of the bladder; and retention of urine is not uncommon after a full dose of opium. Here opium probably acts by blunting the sensibility of the centres which are connected with the reflex relaxing of the vesical sphincter, from sensory impressions created by the full bladder.

But opium, and its derivative, morphine, do not act only upon the cerebro-spinal system, but upon every nerve-cell, and probably every nerve-fibre. Gscheidlen found that morphine acted upon both the respiratory centres and the intra-cardiac ganglia. In its influence upon these centres it displayed the same action as it produces over the cerebro-spinal system, viz. a brief period of excitation, followed by diminution and final abolition of all action. Opium, too, as is well known, arrests action in the intestinal canal, at the same time checking the flow of gastric juice and the intestinal secretion, causing constipation. Thus it is useful in certain forms of irritable dyspepsia and in diarrhœa; especially in that form where, from hyperæthesia and irritability of the intestinal canal, the food is swept away before it has had time to be digested and assimilated. It is very important to discriminate carefully the form of diarrhœa in adjusting the proportions of opium and the astringent selected. Where the secretion is profuse full doses of the astringent are indicated; where there are many motions in the day, yet the quantity passed is in the aggregate but small, then opium should be given freely. In colic, and other spasmodic affections of the intestines, opium, especially in combination with carminatives and stimulants, is very useful. In peritonitis opium is the favourite remedy. Not only does it deaden the receptivity of the nerve-centres to impressions, including, of course, pain; but it also has a powerful effect upon the bowels, limiting peristaltic action and lessening the friction of the inflamed membranes. In uterine diseases, and after operations in the neighbourhood of the intestines, opium is very serviceable from its effect upon

the movements of the bowels. Opium, too, limits the activity of the viscera, and is useful in diabetes and azoturia; probably in each case even more by its action upon the liver than upon the kidneys.

Opium is used to limit motor action, but not nearly to the same extent as it has been resorted to to relieve pain. The latter opium does most effectually, and in this respect it differs markedly from chloral hydrate, though they are both powerful hypnotics. In many cases where the dose of opium is insufficient to produce sleep, it will so far diminish the receptivity of the sensory centres as to relieve the sensation of pain in painful conditions. Thus opium is an analgesic as well as an hypnotic. In all forms of pain, except neuralgic states, opium is our favourite remedy and our most trusted analgesic. How it exercises this action we can inquire after we have reviewed its hypnotic action, which will next engage our attention.

In the production of sleep there are two factors requisite: (1) an action upon the vascular system which will permit of cerebral anæmia; and (2) an effect upon the cerebral cells, which results in their diminished activity.

The vascular conditions requisite for sleep may be taken first. At one time it was supposed that sleep was due to congestion of the brain, and that opium produced its somniferous effects by inducing cerebral congestion. But as it became more and more clearly evident that functional activity of any part is strictly related to its blood-supply, that is, its supply of arterial blood, careful observations and experiments were made, which resulted in modifying materially our views as to the conditions under which sleep occurs. Sleep is a condition of cerebral anæmia; coma one of venous congestion. Sleep passes into coma when venous fulness is superadded to arterial anæmia within the cranium. In poisoning by opium there is much venous fulness. In moderate doses opium produces sleep: in fatal, or even in large but not necessarily lethal doses, it induces coma. The chief effect of opium in the production of sleep is upon the cerebral cells, but nevertheless there is also an influence upon the vascular system. At first opium increases the pulse-rate and the arterial tension; but afterwards both are lessened below the normal point. The first action of opium is that of the

production of excitement, during which there is also increased vascularity of the encephalic arterioles. In the pathological condition known as coma, which is analogous in many respects to profound and long-continued sleep, the brain is congested, and in all probability the cells of the nervous system are subjected to abnormal pressure. Then follows contraction of the cerebral vessels, a fall in the blood-pressure generally, and, with these, lessened activity in the nervous system takes the place of excitement. This lethargy following activity was at one time attributed to exhaustion of the stimulated nerve-centres. We no longer hold this view; but we know that this diminished functional activity is accompanied by distinct reduction in the cerebral vascularity—partly the consequence of the fall in the blood-pressure and the contraction of the encephalic arterioles, partly the outcome of the effect upon the cerebral cells, so that they do not attract blood so actively. When we wish to produce sleep in conditions of vascular excitement with a full and bounding pulse, it becomes necessary to administer opium in combination with some distinct vascular depressant, as tartar emetic, aconite, or chloral hydrate; otherwise those changes in the circulation indispensable to sleep cannot be procured. From its very decided effects upon the circulation, choral is to be preferred to opium in conditions of vascular excitement, either inflammatory or febrile; or they may be given together if pain also be present.

It has been suggested by various physiologists that the rest into which the central nervous system enters at least once in the twenty-four hours is induced by the action of the waste products of the tissues, and especially of lactic acid, when they have accumulated beyond a certain point. Both opium and chloral hydrate act upon the cerebral cells—the second part of the action of hypnotics. We cannot yet speak very explicitly about this action; all we may say is that they produce their effects, we have every reason to believe, by an action upon the cerebral cells, lessening their functional activity, and, with it, their demand for arterial blood; at the same time that the blood-supply to the cells is diminished. By this combined condition—of arterial anæmia and lethargy in the cerebral cells—sleep is brought about.

From this consideration we may now pass on to the examina-

tion of the action of opium as an analgesic. We are all familiar with the fact that pain puts away sleep until sheer exhaustion wraps the sufferer in oblivion. It is said that Damiens slept during the intervals of the rack. The activity of the cerebral cells is maintained and kept up by impressions of pain coming in by the afferent nerve-fibres. The arrest of pain, the cessation of these painful sensations conveyed by centripetal nerves, as by the extraction of an aching tooth, or the opening of a whitlow, is at once followed by sound, dreamless sleep. A state of exhaustion is induced by sustained persistent pain, and relief from these painful impressions is followed by a state of quiescence in the cerebral cells; the evidence of which is furnished by long, sound sleep. Several days indeed may elapse after a period of sustained acute pain, either bodily or mental, ere the cerebral cells recover themselves, and the normal sensations of vigour and elasticity in the nervous system are again experienced. This, as is well known, was the case with Audubon the naturalist, after discovering that mice had eaten all his drawings of birds, the fruits of years of labour. An analgesic is an agent which diminishes painful sensations. This power opium possesses very markedly. If, in conditions of acute pain, it be given in moderate doses, it will merely palliate the condition, reduce its intensity, and no more. A larger dose, however, will subdue the sense of pain, though it may not be sufficient to produce sleep under these circumstances; *i. e.* the impressions coming in by the afferent nerves, though no longer equal to producing painful sensations, are still powerful enough to maintain a condition of activity in the cerebral cells. A still larger dose of opium will annul these last remaining effects upon the cerebral cells and procure sleep.

There are some direct experiments which demonstrate the analgesic action of opium; but the bulk of evidence is furnished by the conclusions drawn from careful clinical observation of its action. It is abundantly evident that the effects produced by opium are in a manner antagonistic to the action by which pain is manifested. The sensation received in the brain as pain—say in onychia of the great toe—has passed from the periphery, along a nerve-tract of cells and fibres, until it is received in the sensory cells of the grey matter of the brain,

probably in the optic thalami. It would appear that opium lessens the conductivity of nerve-matter, of fibres probably as well as cells, and so diminishes the force of each impression—as seen in the lessened pain produced by a comparatively small dose of opium, even when not equal to arresting entirely the transmission of the impression. In larger doses the impression becomes so lost in the transmission that it is no longer felt as pain, though still sufficient to maintain a condition of wakefulness in the cerebral cells. Pain raises the blood-pressure except when amounting to shock. It would seem that the effect of opium is felt in the receptive nerve-centres as well as in each and every part through which the pain-producing message passes; and the force of the original excitant is so diminished that it falls below a pain-producing point when ultimately received in the brain. A still larger dose of opium is sufficient to neutralize all consciousness of the pain-exciting impression, and to arrest the unfelt perturbations in the cerebral cells; and then sleep is secured.

In this analgesic action opium is markedly superior to chloral. In conditions of sleeplessness due to pain chloral is of comparatively little or no value, and opium is the agent to be relied upon. The Easterns print "Mash Allah" (the gift of God) upon the cakes of opium, in consequence of its special properties. When, however, the painful state is due to an inflammatory condition, the addition of direct vascular depressants is indicated. If the painful state be due to inflammation of the brain itself, the depressant must be given without opium.

Opium is of no value in subduing morbid motor activity, as tetanus, chorea, epilepsy, or paralysis agitans. In these conditions other sedatives are more useful. In conditions of spasm, however, especially in the intestines or bladder, opium is effective; and its action on the muscular fibre of the gastro-intestinal canal is pronounced.

§ 125. The effects of opium are felt in other parts of the nervous system than the intra-cranial centres—in the periphery as well as the centre. This is shown by the relief furnished when opium is applied locally, as to a blistered surface, a painful ulcer, or piles. It seems to exercise an anæsthetic effect upon the terminal distribution of nerve-fibres in the tissues, and not

only affords relief, but, by lessening the irritability of the part affected, aids in repair and recovery. Thus, in affections of the pelvic organs, the local application of opium, or its use as a suppository, is to be preferred to the administration of it by the mouth. In localized pain the application of opium endermically, or, better still, hypodermically, is desirable. In cases of gastric irritability, where the stomach rejects everything, these means of administering opium are invaluable.

Opium possesses another action often very useful, and that is its power to arrest excessive secretion. Thus in diarrhœa we find it not only controls the peristaltic action of the intestines, but it checks secretion. How far it achieves this effect by action upon the peripheral nerve-fibres in the glandular structures solely, or whether it also acts through the blood-supply, is not quite clear. There have not yet been a sufficient number of observations and experiments made to decide the matter. Opium exercises a decided effect in weakening or destroying the effects of a stimulus to sensory nerves, thus diminishing the blood-supply to the part. It is possible that a part of the good effects of opium in inflammations is due to such action; for limiting the blood-supply to an inflamed part will give the same relief as raising the hand does in lessening the pain of an inflamed finger. This action of opium is important, especially in such an inflammation as peritonitis. If, indeed, to the analgesic effect of opium, on the periphery as well as the centres, be added its effects in controlling the vermicular action of the intestines, and so limiting motion; and, beyond these actions, again, its power to restrict the vascular dilatation of an inflamed part; then there can be no difficulty in estimating its utility in the treatment of peritonitis.

It has also been found that when a large dose of opium is given to an animal it abolishes the secretion in the submaxillary glands, which is excited reflexly by irritation of the lingual nerve. Not only so, but opium acts upon the secretory nerves themselves in the gland. If the narcosis be deep it appears that unusually strong electric currents are necessary to excite secretion; and the quantity of fluid obtained under the circumstances is less than that which is furnished when woorara is employed instead of opium. From this it would appear that

opium exercises some direct effect upon secretion by an influence over the nerve elements of a secretory organ: and this action explains the utility of opium in the control of excessive secretion.

The activity of one secretory apparatus, however, is often stimulated rather than arrested by opium, and this is that of the sudoriparous glands. Excessive perspiration is one of the effects of a full dose of opium; and opium in the form of Dover's powder is in many cases a valuable diaphoretic.

§ 126. Chloral hydrate is a drug which stands second to opium only as an agent which depresses nervous action. There are differences, however, between the actions of these two agents, which are far from unimportant. We have seen that for the induction of sleep two factors are requisite, viz. cerebral anæmia and a quiescent state of the cerebral cells. Opium acts more pronouncedly upon the cells than the circulation; whilst the effects of choral are most markedly felt by the circulation and to a less extent by the cells. "The sleep induced by chloral is due partly to the direct action of the drug on the brain, and partly to contraction of the blood-vessels supplying that organ. Chloral first congests the retina, but subsequently contracts the vessels so that the retina assumes a pale pink colour. The paralysis caused by chloral is due to the direct action of the drug on the spinal cord. Chloral acts first on the grey matter of the cord, and impressions, which are usually painful, are unperceived at a stage when tactile impressions still produce reflex movements" (Murrell's *Pharmacology*). As an analgesic chloral is far below opium; but in conditions of sleeplessness due to arterial fulness chloral is superior to opium. Where vascular excitement and pain coexist, chloral and opium may be combined. It must not, however, be supposed that chloral does not possess a very decided effect upon the nervous system. In fatal doses it arrests both respiration and the circulation by its effects upon the nerve-centres of these systems. It also acts upon the cerebrum and the centres at the base of the brain; whilst it has a decided effect upon reflex irritability. From its double effects upon the nervous system directly and upon the circulation, chloral has been found useful in the treatment of mania. Chloral, too, is an excellent remedy in cases of cerebral

irritability from overwork, giving calm refreshing sleep. There is much room, however, for anxiety as to this last use of chloral. For such end it is often taken without professional advice, and great mischief has followed its abuse. Properly used, no doubt, it is of the greatest utility, and by its means serious injury has often been averted; but it can cut both ways, and it is not an agent to be trifled with with impunity. By its combination of qualities, as a powerful vascular depressant and a sedative to the nervous system, chloral is indicated in all cases of cerebral irritability with encephalic vascular activity, especially with a tense radial pulse. Where there is high arterial tension chloral may be continued without danger; but when the pulse is feeble and the extremities are cold, its use is fraught with danger. It is in such cases that fatal results sometimes follow an ordinary dose of chloral in those habituated to its use. Chloral exercises a powerfully depressing influence over the body-temperature. In consequence of its powerful effect upon the heart, Da Costa advises caution in the administration of chloral in cardiac debility; and this caution is well worthy of attention, especially where a muscular chamber is struggling against a tight stenosis. Chloral has been found to diminish pain which accompanies uterine contraction. Chloral is useful very commonly in the treatment of convulsions in children.

Altogether chloral is a potent remedy, and as an hypnotic, in certain conditions, is of much value. In cases of sleeplessness it is by no means a matter of indifference whether opium or chloral be chosen as the hypnotic. The choice in each case ought only to be made after a careful consideration of the indications, which we have just seen may differ considerably; under certain circumstances these agents are best given together.

As illustrations of the evil effects of chloral we may refer to its employment in the sleeplessness of melancholia, where it seems to still further starve the anæmic brain, and tends to transfer the condition from that of temporary melancholia to the more advanced and permanent condition of chronic dementia; and to the intellectual prostration which ensues from resort to it in the sleeplessness of overwork; especially in those persons whose circulation is not very vigorous.

§ 127. Another powerful remedial agent is bromide of potassium. This agent has been used both as an hypnotic and analgesic, but still more largely in order to control disorders of motility—whether direct or the result of reflex irritation. It unquestionably exercises a powerful influence over the nervous system, and in cases of poisoning by bromide of potassium the chief symptoms have been cerebral—such as loss of memory, confusion and torpidity of thought, a tardiness of apprehension and answer, with lethargy. The symptoms produced by toxic doses of this agent are those of a diminution of cerebral activity. But other portions of the nervous system are affected by bromide of potassium. The nervous arrangements of the circulation are affected by it; the action of the heart is lowered by large doses, and the heart is brought to a standstill in diastole. This is due to the action of the potassium of the salt. Many practitioners always prescribe the bromides of sodium when the action of the bromides is required. In man the bromides have no toxic action, and there is no authentic case of poisoning by bromide of potassium on record. It exercises a decided effect upon reflex action, even when applied locally, as to the pharynx. In cases of hyperæsthesia, or irritability of the reproductive organs, the effects of bromide of potassium are well known. Where the system is suffering from suppression or repression of the sexual instinct, as in involuntary celibacy, this drug possesses an almost unique power. It is very useful in the treatment of menorrhagia in girls and young women, and again at the menopause, where there is often much sexual excitement, indeed a recrudescence of the generative instinct; but in other forms of menorrhagia and in flooding from uterine tumours, it is useless.

In convulsive disease of all kinds it is most valuable, and especially when associated with some distant irritation, or of reflex origin. According to our best authorities it has entirely changed the prognostic aspect of epilepsy. In small doses it usually exercises but little influence; but in half-drachm doses of the mixed bromides three or four times a day it is a powerful remedial agent, often keeping the fits away for months. The return of the fits after its use is discontinued, and their suppression again by resort to it, demonstrate, and place beyond

doubt, its unquestionable utility. Its action is most marked in cases of epilepsy linked with excitement about or in the reproductive organs. It is also especially useful where convulsive movements are the result of habit; as for instance in the cough which remains after pertussis, when the specific element has vanished. It is of service in the treatment of laryngismus stridulus; and is often effective in the treatment of chorea. As to the vomiting of pregnancy, so intractable to ordinary measures, it usually yields to the bromide quite readily; the vomiting ceasing not unfrequently within twenty-four hours from the commencement of the use of this agent; any passing excitement in the generative organs may, however, induce a temporary return of the vomiting, even when the arrest of it by this drug is well marked. Bromide of potassium, or ammonium, possesses a very marked power in diminishing nerve-activity; and even still more in arresting nerve-conductivity, so that in all cases of action of reflex origin it is invaluable. That portion of the cord which receives and transmits reflex impulse seems especially under its influence.

The effects of bromide of potassium upon the cerebrum are very decided. In the irritability of young children, where there is general hyperæsthesia, so that the peristaltic movements even give pain; in night-terrors, nightmare, and night-screaming it is useful. In all cerebral excitement, either in children or adults, it is of service. Sometimes in the latter months of pregnancy a woman becomes at night the prey of the most frightful imaginings, labouring under the impression that she has committed, or is about to commit, some great crime or cruelty, as the murder of her children or husband. The bromide dispels these illusions, and induces calm, refreshing sleep. In cases of cerebral excitement, as in the delirium of febrile affections in children, where there is some vascular excitement also present, the bromide may be combined with chloral hydrate with advantage. The following formula is appropriate for a child of six:—

Pot. Brom. gr. x.
Chloral Hydrat, gr. v.
Aq. Anethi, ℥ii.
6tâ. quâque horâ.

In the insomnia of overwork, or of mental tension, the bromide, if less potent, is infinitely less dangerous than chloral.

Finally, there is another action of bromine, which is valuable, and that is its power to check the headache, and other uncomfortable feelings in the encephalon, which are produced in many persons by the use of quinine, or of iron. The potassio-tartrate of iron and bromide of potassium together can often be tolerated where iron alone disagrees; and by giving bromine, in the form of hydrobromic acid, as a solvent of quinine, instead of some other acid, quinine can be borne by those who, under other circumstances, would prefer their malady to the effects of the quinine.

§ 128. Such are the most notable and energetic members of a very important group of remedial agents. There are other members of this group possessed of similar properties in a less degree, as, for instance, the hop, which in the form of tincture is often useful in insomnia in gouty conditions where opium is usually inadmissible. Commonly the less potent members of this group may be used as vehicles for the more energetic forms with advantage. Thus an excellent anodyne is formed by combining the tincture of opium with the tincture of hyoscyamus, one part of the former to two of the latter.

A few practical combinations may now be given. In cases of cerebral excitement with vascular fulness, as in acute pyrexia or inflammatory affections, not being situated in the brain itself, opium may be given with antimony, and

℞ Tinct. Opii, ♏xv.
Vin. Antimon. ♏xx.
Mist. Camph. ℥i.

every four or six hours, will be found a good combination; or a grain, or a grain and a half, of powdered opium may be given with five grains of James's powder at bed-time usefully in many pyretic affections.

The forms in which opium may be administered are legion. As a fluid, as a powder, in pill, as a suppository, hypodermically or endermically, it, and its derivatives, may be used. The plan of giving morphine hypodermically is now universal, and the effects of the drug when so given are certain and withal speedy.

Opium may be applied locally by this means; or by blistering a surface and sprinkling it with powdered opium or morphine; or as a liniment, or plaster applied to the general surface. Opium and chloral may often be combined with advantage, and

Tinct. Opii, ℥x.
Chloral Hydrat, gr. xv.
Mist. Camphoræ, ʒi.

three or four times a day is an excellent combination in painful conditions, where there is also a febrile temperature and vascular excitement. In cerebral excitement, where the pulse is not very feeble, such combination would be useful. Either opium or chloral may be combined with bromide of potassium in certain cases with good results, especially in cerebral excitement in children, as in the delirium of the exanthemata. Thus—

Pot. Brom. gr. x.
Chloral Hydrat, gr. v.
Aq. Menthæ, ʒss.

may be given to a child of sixty pounds weight, at intervals of four or six hours, for twenty-four hours, with good effects in acute febrile delirium. The effects of combining two agents of allied action are often, indeed usually, very satisfactory. In cases of excitement about the generative organs bromide of potassium may be given with hyoscyamus, with good expectations.

Pot. Brom. ℥ss.
Tinct. Hyoscyami, ℥ss.
Mist. Camph. ʒi.

given at bed-time in chordee, in nocturnal orgasm, and sexual excitement, usually produces excellent results. Tincture of cannabis indica, tincture of hyoscyamus, and bromide of potassium, in half-drachm doses each, at bed-time, afford a satisfactory means of inducing sleep in restless talkative mania. Where there is coexistent anæmia, the addition of iron is indicated; bromide of potassium and the potassio-tartrate of iron in ten-

grain doses each form a useful measure, even where chalybeates in other forms have failed.

These are but a few examples of the combinations which may be used to control nervous activity.

§ 129. We may now proceed to discuss the subject of morbidly active secretion, and the most successful means of allaying it. We have already seen how neurotic agents will affect a secretion excited reflexly by far-away irritation; and how opium arrests certain secretory actions. Consequently the use of opium in hyper-activity of the secreting surface becomes quite intelligible, and its use is rational. In all cases of catarrh from mucous membranes opium is serviceable, except when it is bronchial; where this agent is to be shunned, except under watchful intelligent care. In free secretion from the intestinal canal opium is ever of service, except where the diarrhœa is a vicarious, compensating discharge in renal inadequacy, or excited by an irritant mass.

Astringents.—This group of agents arrest the action of secreting organs, and also check hæmorrhage. Up to a recent period it was asserted that astringents exercised their power by virtue of their action upon muscular fibre, producing contraction of it; while others held that their action depended upon their capacity to coagulate albumin. Neither of these hypotheses is now entirely accepted; and the action of astringents is at present thought to depend chiefly upon some yet undiscovered action upon the soft tissues. Like tonics, their practical application is far advanced beyond our knowledge of their *modus operandi;* and the actual efficiency of both these groups of agents is well-established and notorious. Astringents are of two kinds—mineral and vegetable. The vegetable astringents are tannin and gallic acid. Tannin is converted into gallic acid in the system; and both are excreted by the kidneys as gallic acid. They both coagulate albumin. In gastric catarrh the combination of tannin with opium, as in the form of compound kino-powder, is ever of service. Tannin will at times check the loss of albumin by the kidneys. In hæmorrhages gallic acid and opium are commonly resorted to, as in menorrhagia, in melæna, in hæmoptysis, or hæmatemesis. In the uterine hæmorrhages of anæmic and atonic individuals,

especially in those of the lymphatic diathesis, such combinations are frequently indicated. In intestinal catarrh, opium—with catechu; with sulphuric acid and hæmatoxylin (an excellent measure); or with acetate of lead, or sulphate of copper in pill—is our universal remedial agent. In regarding the action of opium in the various forms of diarrhœa, or rather intestinal fluxes, as they should be called here, its effects upon the cutaneous vascularity and the sudoriparous glands must not be overlooked; the derivative action may tend to lessen the flux as well as by its direct action upon the intestinal canal. Be this as it may, opium in conjunction with astringents, vegetable or mineral, is signally useful in all excessive secretion from the bowels. Mineral astringents are of various forms. Most of the bases form astringents in union with sulphuric acid—the astringent action of the acid being preserved in the sulphate. Glauber's salts (sulphate of sodium) and Epsom salts are, though purgatives, not without astringent properties, and may often be most advantageously combined with other astringents. Thus in menorrhagia they are very useful, the action on the bowels here being an advantage when added to opium and sulphuric acid. Even hæmorrhage from the bowels does not contra-indicate sulphate of magnesia in small doses, especially in passive rectal hæmorrhage. In this troublesome affection, not rare in women, where without warning they find a gush of blood from the bowels, either at stool or just on leaving it, a small quantity of sulphate of magnesium along with dilute sulphuric acid is indicated.

Mag. Sulph. gr. xv.
Ac. Sulph. Dil. ℥xv.
Inf. Cinchon. ℥i.

three times a day will usually arrest this loss, as well as other forms of passive hæmorrhage. Some very active astringents are formed, however, by the union of bases with other acids than the sulphuric, as the perchloride of iron, acetate of lead, &c.

In the arrest of secretion belladonna possesses peculiar properties, especially over the salivary, the mammary, and the sudoriparous glands. Dryness of the fauces, too, is the most marked symptom of belladonna poisoning. The arrest of the

secretion of the sub-maxillary gland by belladonna is due, Schiff thinks, to its paralyzing the chorda tympani. It has long been an empirical practice to paint belladonna over the mammary glands when the lacteal flow is excessive, and satisfactory results often ensue therefrom.

Inaction.

§ 130. Under other circumstances, especially in general debility, and, still more, when the activity of the nervous system is impaired, we administer a class of agents of totally different character to those just described. The neurotic agents now to be briefly considered are those which excite nervous action. They consist mainly of the deliriant poisons, of quinine and strychnine. There is a large amount of evidence pointing in the direction that these different agents increase nervous action and stimulate the cerebral cells to attract more blood, so that their functional activity is increased and maintained. Probably, to some extent, they also act upon the heart and increase the activity of the circulation. In belladonna poisoning there is extravagant delirium of which no memory remains; but there is no sleep, because the brain is rendered hyperæmic rather than anæmic by this agent. The delirium of belladonna poisoning may be due to arterial dilatation and afflux of blood to the brain. Belladonna has been found useful in the treatment of some cases of melancholia where there is cerebral anæmia; its effects are most marked in the early stages of emotional melancholia. In conditions where the amount of arterial blood passing through the brain falls below the norm, belladonna certainly seems indicated; for it also increases the ventricular contractions, and raises the blood-pressure. In this it is the antagonist of the calabar-bean, which lowers the heart's action, and consequently is given in conditions of cerebral excitement—as in the exalted stage of general paralysis, as well during the paroxysms as in the intervals of comparative quiescence—with very powerful effects. In these different and opposite effects upon the encephalic circulation we see two classes of agents shadowed out which will exercise a profound influence over the therapeutics of the future. Belladonna acts powerfully upon

the heart, increasing its contractions at the same time that it contracts the peripheral arterioles in many parts of the body. This contraction has been seen in the frog's foot under the microscope. By these means combined the blood-pressure is raised, as it is by digitalis; with this difference, however, that digitalis is not a deliriant poison. In some respects there is a similarity between the action of belladonna and alcohol; only that alcohol ultimately dilates the arterioles of the body generally, and so leads to cerebral anæmia as a sequel to the cerebral hyperæmia first produced by it. No such secondary action has been demonstrated to belong to belladonna except in very large doses. We are not yet, however; sufficiently acquainted with the effects of belladonna upon the intra-cranial circulation to lay down exact rules for its administration in cerebral anæmia. As a remedy in certain neurosal affections belladonna has long enjoyed an empirical reputation, especially in the treatment of whooping-cough and in the nocturnal incontinence of urine in children. In the latter case it is supposed to affect those centres in the spinal cord which are associated with the vesical sphincters. Possibly it affects the susceptibility of the centre which relaxes the sphincter, so that stronger stimuli, or impressions received by the sensory nerves of the bladder, are requisite in order to induce it to relax. However this may be, spasmodic contraction of the vesical sphincter has been found in cases of belladonna poisoning. Belladonna is as useful in allaying the vesical irritability of old men, as it is in the incontinence of urine in children. Where there is chronic bronchitis with emphysema and much nocturnal disturbance from calls to empty the bladder, belladonna or atropine is the agent indicated *par excellence.* Belladonna stimulates the respiratory centres in the medulla, while it is a sedative to the vesical centres in the spinal cord. The value of belladonna in painful states, especially neuralgic, is variously estimated. As a local application its analgesic properties are much more certain and marked.

Some diversity of opinion obtains as to the analgesic and hypnotic properties of cannabis indica. Our experience of this drug as a therapeutic agent does not do much to explain its action; though it is well known in the East as a deliriant

poison, and is alike used by the Malays when "running an amook," and by the Dacoits of India, who give it in sweetmeats; by means of which they can commit offences without the poisoned person being able to remember anything, and so being unable to give evidence against them. As such, it is largely used to rob persons of their personal ornaments with impunity. The temporary condition into which persons are thus thrown by hashchish is identical with that brought about by stramonium, where assaults upon the person may be practised with impunity. Medicinally it has been used to limit the flux of menorrhagia and to relieve neuralgic pains. It is often resorted to as an intoxicant; the intoxication produced by it being of a singularly agreeable character.

§ 131. A somewhat less difficult subject, though far from clear or simple, is the action of these two prominent members of the pharmacopœia—quinine and strychnine. That these agents possess a powerful influence over the nervous system is a fact too well known clinically to admit of any question being raised as to the facts; though we are not yet quite clear as to the interpretation of them. Further, we have learned empirically what are the conditions which indicate their administration, at least fairly well. We use them in certain adynamic conditions as tonics. Here we are concerned with them only in so far as they are neurotics, and with their action upon the nervous system.

To take quinine first: It is well known that this agent possesses the power of giving a sense of fitness for exertion, of energy, to persons lacking these feelings; which it probably effects by some invigorating effect upon the nervous system. Thus it is most useful in cases of nervous debility, in convalescence from low forms of fever; it is also resorted to in conditions of fatigue and exhaustion, as a species of dram, only its effects are more enduring and persistent than those induced by alcohol. For such purposes it is largely consumed by persons on their own responsibility, without medical advice, as the large sale of quinine wine testifies. It forms a nervine stimulant and tonic of no mean properties, and is free from several drawbacks which attach to alcoholic stimulation. When given in full doses, quinine produces marked effects upon the contents of

the encephalon called "cinchonism." In this state there are disturbances of hearing, notably the ringing of bells; and disturbances of vision, as flashes of light; delirium, and headache with a sense of constriction, often relieved by epistaxis. In fact these are the evidences of encephalic hyperæmia. It has been demonstrated that quinine dilates the cerebral vessels and produces vascular congestion of the contents of the encephalon. There were increased action in the carotid and temporal arteries, and heat of head, with congestion of the retina, and tympanum. These results were such as might have been anticipated from our previous acquaintance with quinine, as furnished by our clinical experience. In cases of cerebral anæmia accompanied by a craving for alcohol—often quite irresistible—quinine is very useful, and combined with iron and strychnine often puts away the craving entirely; but it commonly returns in its pristine intensity when the action of the quinine wears off. It is also a potent remedy in cases of nervous exhaustion or of overwork, but if resorted to merely to whip on a flagging brain, its use may be detrimental; and if it postpones the collapse, may make it all the more severe when it does come.

In strychnine we possess an agent of unquestioned power as a neurotic. In toxic doses this drug produces severe and prolonged spasms, in which the body is arched, resting upon the head and the heels. So terrible are these convulsions, that death is commonly induced in an hour or so. It is noticed, however, amidst all this motor perturbation, that the intelligence is unclouded and that consciousness is unaffected. This leads to the conclusion that the spinal cord is the part chiefly affected by strychnine. In conditions of degeneration of the spinal cord, especially when of an anæmic character, strychnine is very valuable; and in certain conditions of adynamy, as in incontinence of urine, it is very useful, and most so in the dribbling of elderly persons. In this it contrasts with belladonna, which seems to diminish the susceptibility of the vesical centres in children; while strychnia appears to stimulate these centres, connected with the sphincter, in elderly persons. Its effect upon the cord too, is to stimulate the nervi-erigentes which inhibit the ganglia of the penis. Ordinarily these

centres, which seem little detached pieces of the vaso-motor centre—centres which have retained their original locality while the others have travelled up to the medulla oblongata—keep the vessels of the penis contracted, and then the organ is flaccid; but when the nervi-erigentes are thrown into action the influence of these local centres is subdued, or inhibited, and the vessels of the corpus cavernosum dilate, and the penis becomes turgid and erect. After the administration of strychnine in many persons this state of erection is persistent. Strychnine, too, possesses a decided action on the heart, and from this action is often given with digitalis. Strychnine acts powerfully upon the vaso-motor and respiratory centres, increasing their activity. It also acts powerfully upon the respiratory centre; and is a true stimulating expectorant; valuable alike in the prostration of acute bronchitis, and in the respiratory embarrassment of chronic conditions. As a true stimulating expectorant, strychnine has a great future before it. It also induces contractions of the uterus; and is used by some practitioners instead of ergot; while its effects upon the intestinal muscular fibre are such that it is largely added to cathartics in cases of constipation allied with inertia of the bowels, and in cases of intestinal dilatation with partial paralysis of the muscular fibre. From the rapidity of its action, strychnine is regarded as lying midway betwixt stimulants and tonics. In the form of the tincture of nux vomica (fifteen drops), with carbonate of ammonium (five grains), three or four times a day, it is a capital substitute for alcohol in the treatment of adynamic conditions, and in commencing convalescence. Strychnine is often administered with quinine and iron, in the following well-known formula:—

Fer. et Quin. Cit. gr. v.
Liq. Strychniæ, ℥iv.
Inf. Quass. ℥i. ter in die.

§ 132. We have now seen that we possess agents which depress or lower nervous action; as well as an opposite series which will exalt nerve action. It is true the review here given is but brief, and that the action of the agents is sketched in outline merely. Many more experiments are required, not only

for what they may directly reveal, but for the information they may furnish indirectly in giving aim to clinical observation. Much indeed has to be done before we can venture to say definitely what are the exact actions, often complex and sometimes apparently contradictory, of these powerful neurotics whose aid we have so often to invoke. We can see that we possess one group by which we can simultaneously depress nerve action and lower the circulation, and which consequently we can wield with effect in cases of abnormal and undesirable activity in the nervous system; while we are equally clear that there is also another group which excites nervous action, while at the same time the supply of arterial blood to the nervous system is increased, and so the action is maintained. As yet our employment of these neurotics has been rather empirical than rational; but, as our knowledge as to the physiological actions of these remedies becomes more precise, so we shall be able to wield these agents in practice with more definite aim and greater certitude. Even now we can calculate with some certainty the effect that will be produced by several agents, as in the case of the ordeal bean of Calabar in the wild paroxysms of general paralysis; of bromide of potassium in epilepsy and other affections the result of reflex irritation; and of quinine and strychnine in debility and anæmia of the cerebro-spinal centres. Further, we can already combine agents possessing opposite or even antagonistic properties with advantage, by differentiating the exact action of each remedy: thus in delirium tremens, where there is a rapid feeble pulse with insomnia and agitation, digitalis may be combined with the bromide of potassium with excellent results; while in cases where quinine produces headache, often of a very distressing character, the addition of bromine, in the form of the hydro-bromic acid, will sometimes give relief; so that the good effects of the quinine may be secured without this unpleasant drawback. So too in the hacking cough of phthisis we can give a full dose of opium or morphine, and by the co-administration of atropine we can at once prevent the profuse sweats, which are so exhausting, and the dangerous depression of the circulation and the respiration which result when a full dose of opium is given alone; while the other effects of the narcotic are not interfered with.

§ 133. *Irritation and Counter-Irritation.*—It has long been a practice in the art of medicine to resort to agents capable of exciting activity, and especially vascular activity, in a part, when applied locally, to relieve abnormal action going on elsewhere. This artificially-excited action was supposed to relieve and reduce the pre-existing malady; and this line of treatment has been denominated variously, according to circumstances, irritation and counter-irritation. It took its origin probably in observations of the following kind: in the exanthemata the more copious the eruption the less the internal complication, ordinarily at least; and that any retrocession of the eruption was followed by gravescence in the internal affection; in the metastasis of gout, of mumps, &c., as soon as another part became affected the part originally implicated was relieved; and in the relations of cutaneous maladies to internal diseases in chronic disease, the disappearance of the rash often being followed by a distinct exacerbation in the visceral ailment. By a far from unintelligible induction our predecessors concluded that to set up artificially some irritation elsewhere would exercise a beneficial effect over the disease they were essaying to treat. There was an element of truth in their conclusions; and unquestionably hot pediluvia do often relieve head symptoms, and blisters to the legs are found useful in diminishing congestion of the contents of the cranium. The advocates of blistering could also take a pretty firm stand on the ground that such treatment did relieve and diminish accumulations in the serous sacs, as of the thorax, the abdomen, and the articulations. The good effects here are distinctly intelligible by the law of Schrœder van der Kolk, that the vascular supply of the deep-seated parts is derived from the same arterial trunks as that of the superficial parts. Any dilatation of the cutaneous branches and increased blood-flow in the superficial distribution will diminish directly the current in the deep-seated vessels. Thus in inflammation of the pleura for instance—the costal pleura, that is—the application of dermal irritants, either heat or vesicatories, will dilate the cutaneous terminations of the intercostal arteries, and diminish the blood-supply to the pleural arterioles, and so lessen the vascularity of the inflamed area This is clear enough. In the same way dilatation of the cutaneous vessels of an articulation, say the

knee, will be followed by a lessened blood-flow in the deep articular branches of the arterial trunk common to both. Further, Brown-Séquard found that the renal arteries contracted on irritating the skin over the kidneys. This indicates that there is something more in this matter than the mere hydraulic side of the question. Max Schuler has found that the application of large mustard blisters to the cutaneous surface produces first a passing dilatation of the vessels of the pia mater, and then a more persisting contraction of them, the latter being so prominent that the contraction withstood the effects of agents which normally produced dilatation of these vessels. We all know that plunging one hand into cold water will lower the temperature of the other hand; and that "cold applied to part of a bat's wing causes contraction of the vessels of the corresponding part of the opposite wing." From all this we can comprehend how it may be that counter-irritation may exercise a beneficial effect in cases of inflammation even where the vascular supply of the inflamed part is not derived from the same arterial trunk as is that of the cutaneous surface operated upon. But, while admitting this, we must own that the *modus operandi* here is far from being so clear as it is in those cases where the common vascular supply exists, as in counter-irritation in inflammations of the pleura, peritoneum, or the serous sacs of the articulations; or in those more chronic affections of joints where there is deep-seated hyperæmia, which not rarely produces elongation of the diseased limb from the continued vascularity of the epiphyses.

The law of Schrœder van der Kolk also holds good of the nervous distribution; and as the costal pleura and the skin of the thoracic parietes are alike supplied with blood from the intercostal artery, so are they furnished with their nerve-supply from the intercostal nerves. Thus in the articulations, the deep-seated and the cutaneous nerves spring from common trunks. Consequently the application of analgesic agents to the peripheral extremities of the superficia. distribution exercises an effect upon the deep-seated terminations. That such is a fact is unquestionable; but it is not yet clear how the end is brought about. Either there is some reflex action induced; or some deadening effect is achieved which counteracts the

pain-producing irritation of the deeper-seated terminal fibres, possibly in the common trunk. Be this as it may, there is no question as to the utility of the application of sedative and analgesic agents to the surface over an affected part—in practice. In neuralgia, gout, rheumatism, as well as structural lesions, the application externally of opium, aconite, belladonna, chloroform, and even chloral hydrate, produces desirable effects. It is, indeed, by first recognizing the fact that good does actually result from these therapeutic measures, that we shall be led to investigate the working of them; and then perhaps some day even understand how the results are achieved.

As well as these more localized effects of external applications, there are wider and more general consequences of their employment which may well occupy our attention for a moment. The application of epispastics to large areas of the surface for a brief time, so that they are rubefacients rather than vesicants, in cases of collapse, shock, or even the typhoid condition, is a well-established practice. The results are scarcely the consequences of the pain inflicted solely—for pain, when not too excessive, produces a stimulant action—there is probably some effect produced upon the vascular system generally. Dermal irritants have a direct tendency to arouse or excite the system, and may be used as general stimulants. When so used as passing rubefacients, probably the action upon the intra-cranial vessels is limited to that dilatation, which, Max Schuler observed, occurred in the vessels of the pia mater on the first application of blisters; but was followed by contraction on the persistent application of the vesicant. There is nothing in such view inconsistent with what we have seen as the primary and then the secondary effects of several neurotic agents, as opium and alcohol for instance. The use of dermal irritants as stimulants is indicated in states of depression rather than advanced exhaustion; their application should be brief, and be accompanied by the exhibition of other stimulants somewhat freely.

That cutaneous irritants will affect the circulation generally is admitted by many men, and some even go as far as to use blisters in the treatment of irritable conditions of the heart. In this case, however, there is no attempt at reasoning made, it is pure empiricism; and the practice obtains most strongly

amidst those whose physiological knowledge and acquaintance with the circulation least entitle them to form positive opinions. In the following case, dermal irritants were used with an intelligent idea of what they might achieve, and with satisfactory results. Richardson says—"In one instance of intermittency with palpitation, where morphia could not be tolerated, owing to the nausea and depression it produced, and where quick relief was demanded, it occurred to me to apply a blister over the whole of the front part of the neck (the throat), so as indirectly to influence the sympathetics. The effect in this case was simply immediate for good. So soon as the counter-irritation began to be felt, the action of the heart became quieter, the intermittency was reduced, and sleep, which had for several nights been absent, became the welcome visitor. In a second case a sinapism applied to the throat was instantly beneficial. 'I passed,' said the patient, 'as the sinapism took effect, from incessant restlessness, owing to the irregular action of the heart, into deep sleep, and that so insensibly and rapidly, I was not conscious of going to sleep.'" In these cases the good effects might be explained on two hypotheses: (1) direct stimulant effect downwards to the heart, increasing its power; or (2) an effect upon the peripheral arterioles, dilating them and lowering the blood-pressure in the arteries, and thus enabling the heart to contract more easily in the face of a lessened resistance. Either of these effects, and still more their union—an hypothesis far from incredible—would account for the relief experienced.

This brief survey will somewhat clear the ground and render the adoption of irritants less a matter of sheer empiricism when their use is recommended in the ensuing chapters.

Here terminates the first half of this work, which so far has consisted of the inculcation of general principles—either derived from the laboriously accumulated stores of empiricism; or the direct outcomes of physiological research—principles which will be applied in a distinctly practical manner in the consideration of the various maladies, of the different systems and their treatment, which will next engage our attention.

CHAPTER XIV

THE CIRCULATORY SYSTEM

§ 134. In considering the different systems of the body and the ailments of each—the practical application of what has been written before—it is obvious that the affections must be regarded rather according to their indications as groups, than as individual maladies. If the latter plan were to be adopted, the second half of this work would become a mere brief practice of physic; and that is not the design at all. It will, it is believed, be much more instructive to the reader, and tend more to make his treatment rational at least, if no other advantage should arise therefrom, to take groups of maladies and give the treatment of them as a class. By this means, the reader will have but to relegate the case before him to its proper class; and then its treatment, as regards its coarse adjustment, will unfold itself. How to enable any one to recognize the peculiarities of a case, and its individual as compared to its generic characteristics, and so to attain the fine adjustment of the treatment, except by the sweat of his own brow, is, to us at least, unknown. But there are good reasons for believing that by grouping maladies, the individual reader may be assisted to perform a series of generalizations, not in every case attainable single-handed.

Before considering the ailments of each system, it will be necessary to review briefly the physiological action of the different parts of such system, and the relations existing between one part and another. For many reasons it is desirable to commence with the vascular system; and in considering its maladies, it will be found that they form natural groups,

and illustrate the propriety of the principles (just announced) upon which the latter half of this work will be carried out. The treatment of each group will follow; and by this means there is a reasonable hope that the treatment of diseases of the vascular system will approach, to some extent at least, our present knowledge of these maladies as regards their diagnosis.

§ 135. The vascular system consists of a central organ, a hollow muscle—the heart. By the rhythmical contraction of this muscular chamber so much blood is thrown into the aorta at each ventricular contraction; and this blood is prevented from regurgitating into the heart by the aortic valves. The arteries are elastic and contractile. The larger arteries are rather elastic than contractile; while the walls of the smaller arteries are very decidedly contractile, or muscular. This arrangement permits of the blood thrown at intervals into the large elastic arteries being given out by the recoil of the vessels in a steady and continuous flow; while the muscularity of the small arteries regulates their calibre, and with it the blood-supply to the different parts. Thus for instance, when food passes into the stomach the gastric vessels dilate, and so permit of that free flow of arterial blood which is indispensable to good digestion. Under certain circumstances these peripheral and muscular-walled arterioles may become generally dilated, as in acute pyretic conditions; where we find dilated compressible vessels with more or less rapid action of the heart. The blood easily escapes out of the elastic arteries by these dilated terminal vessels, and the pressure of the blood within the arteries is low, while the ventricular contractions are rapid. By these frequent contractions more blood is passed into the elastic arteries, and so they are kept partially filled in spite of the quick outgoing. On the other hand, in certain conditions, we find the terminal vessels contracted, the outflow of the blood from the arteries much arrested, and therewith a high blood-pressure within the elastic arteries, and a slow but powerful ventricular contraction. As a broad rule, generally true, it may be said that the rate of the pulse and the blood-pressure are in inverse proportion to each other: the higher the blood-pressure the slower the pulse. At the same time a more powerful ventricular contraction is required to

force the blood into the arterial system when the blood-pressure is high, than when there is less resistance to be overcome. Consequently we find that a persistent high blood-pressure will induce cardiac hypertrophy, and will also at times occasion palpitation—a laborious effect of the heart—as a symptom. It is very necessary to bear this in mind—palpitation may indicate a fairly strong heart struggling against a heightened blood-pressure; as well as a partially disabled heart fighting away with a normal or even low blood-pressure. The treatment in the two cases, however, will be widely different.

The blood escapes from the peripheral ends of the arterial system into the veins, and so returns to the right heart, by which it is pumped out into the pulmonary circulation, where the blood is oxygenized; from whence it once more finds its way into the left heart. It is at once obvious that when the arteries are well filled with blood the veins will be less full: when the arteries are comparatively empty, the veins will be proportionately full. Venous fulness then indicates arterial anæmia; and our line of treatment, under such circumstances, is to fill the arteries and so to empty the veins. In order to accomplish this we administer an agent which will increase the vigour of the heart, while restraining the outflow from the arteries, by diminishing the calibre of the arterioles; such an agent we possess in digitalis. When from any cardiac impairment the blood is insufficiently pumped out of the veins, and the arteries are unfilled and compressible; the administration of digitalis tends to restore the lost balance. It is obvious that this is not the agent to be chosen when we desire to lower the action of the heart, or to decrease the pressure within the arteries. Yet, from mistaken notions, digitalis is still used by some for the latter purpose. No wonder is there, then, that the use of so powerful an agent should be followed by disastrous results if it be given in the very cases where its use is contra-indicated; or that the drug often gets a bad name, when really it is the knowledge of the administrator that is at fault. When we desire to lower the circulation we must select such agents as aconite and tartar emetic, which dilate the terminal vessels while lowering the activity of the cardiac movements. These agents are never necessary in disease of the heart, unless it be

in some of the complications of aortic regurgitation, in its earlier stages of massive hypertrophy. In actual disease of the heart, what we must ever strive to attain is a restoration of the normal condition of the circulation, or an approach to it, by increasing the capacity of the crippled heart.

The ordinary forms of primary disease of the heart, *i. e.* where the heart is itself at fault, are those of valvular disease and muscular failure. The valves are folds of the lining membrane of the heart, which prevent regurgitation of the blood on the contraction, or recoil, of the walls of the chamber in front of them. If these valves become incompetent to arrest the regurgitation, there follows a certain obstruction to the blood-flow, and if this is not met by increased muscular growth—carrying with it an accession of power—the circulation is so much retarded. Or, on the other hand, if from agglutination of the free edges of these valves the ostium is narrowed, also an arrest in the circulation is established; and muscular hypertrophy can alone restore the lost balance, and enable an equal quantity of blood to be driven through a narrowed orifice in an equal time: an operation absolutely necessary to maintain the working of the organism unimpaired. This is well seen in aortic stenosis, where there is usually hypertrophy of the left ventricle, by which a new balance is attained. If the ventricle is faltering before the obstruction, digitalis will give relief.

In aortic regurgitation the hypertrophy is rather to arrest the dilatation of the left ventricle than to overcome any resistance offered to the outflow of blood, and in the early stages is usually sufficient for this purpose. But this hypertrophy has the effect of causing an unusually and abnormally large bulk of blood to be thrown into the arterial system at each ventricular contraction, with the consequences of over-distending the arteries and establishing in them atheromatous changes. Here digitalis, and its allies, are contra-indicated. But in the later stages, when the muscular structure is being cut down by fatty degeneration, and the power given by the hypertrophy is melting away; then digitalis may be given as a palliative, and an agent giving temporary relief, with advantage. By attention to the action of digitalis, and a careful consideration of the course of aortic regurgitation, the administration of the drug

in this form of heart disease should not be the subject of such diverse opinions as at present exist. Whenever the arteries are insufficiently filled with blood and the heart is faltering, digitalis is indicated, no matter what the form of cardiac lesion —unless it be in aneurysm, either of the arteries or of the heart itself.

§ 136. In mitral disease we never have the arteries too fully distended with blood. Here the tendency is ever towards arterial anæmia; no matter whether the flow of blood into the left heart is obstructed by mitral stenosis; or there is regurgitation through incompetent valves at each ventricular contraction. In regurgitation the left ventricle is very commonly enlarged and hypertrophied through the rush of blood into it from the gorged pulmonic circulation and the hypertrophied right heart. In mitral stenosis such enlargement of the left ventricle is never found. Though this statement is generally true, it does not hold good of the mitral disease which comes on in the latter stages of the "gouty heart." But there the hypertrophy of the left ventricle precedes and is causally related to the mitral valvulitis; and is not secondary to, or the consequence of, the mitral mischief. In mitral disease the compensatory changes consist in hypertrophy of the muscular walls of the right heart with thickening of the walls of the pulmonic vessels. Where the heart is fairly hypertrophied, much capacity to undergo exertion is furnished thereby; where there is dilatation without hypertrophy the condition is serious, and the capacity for exertion is lacking. Our indications for treatment are then to reduce, if possible, the demands upon the right heart, and, at the same time, to encourage its growth. The same holds good of right side changes, induced by disease in the respiratory organs, obstructing the blood-flow in the pulmonic circulation. It is obvious that if the tricuspid valves become the subject of disease, then little can be done; any action upon the right auricle is comparatively useless, and there is no efficient muscular chamber behind the right auricle that is strong enough to be made practically available, though there are strongly contractile muscular fibres in the vena cava, especially the ascending branch. Here we may relieve the venous congestion by appropriate measures, and improve the quality of

blood entering the right heart; but our powers are limited by anatomical conditions which we cannot modify.

§ 137. At other times there are conditions of cardiac debility without any valvular failure. Here there is simply muscular atony with dilatation of the heart-walls from inability on the part of the chambers to contract efficiently, and to overcome successfully, the resistance offered by the blood already in the arteries. At each contraction a quantity of blood remains in the chamber unexpelled, and gradually a conditon of dilatation of the chamber is induced. In these cases the muscular failure is due to imperfect nutrition; not uncommonly combined with an insufficient amount of rest, and often with habits which increase the amount of daily demand upon the heart. At other times there is some myocarditis, usually associated with peri- or endocarditis, and the softened muscular fibre stretches and yields before the demand upon it. Under the circumstances hypertrophy will often arrest the dilatation and endow the dilated heart with power. In these muscular conditions the same line of treatment is indicated as in imperfect muscular growth in valvular disease.

In acute affections of the heart, the same line of practice is clearly to be adopted—for acute affections are ever conditions of adynamy. These affections may be either conditions of acute heart-failure, as syncope; or inflammatory states, as pericarditis. In the first division no one would dream of resorting to any other than restorative measures, alcohol, sal-volatile, &c. In the acute inflammatory states of the heart, depletory or depressant remedies would not now suggest themselves to any unprejudiced mind. To be sure it is possible that the question of meeting the rising inflammation might suggest itself to the mind; but a little reflection will tell us that, as a matter of fact, inflammatory conditions of the lining or external membrane of the heart are never, or almost never, simple inflammations; but rather local expressions of general conditions, as acute rheumatism, pyæmia, or lithiasis. Their treatment then belongs to, and is a part of, that of the general condition; so far as they are affections of the heart only do they call for anything especial; and in so far they demand the treatment proper to cardiac adynamy, and what such treatment is we may now inquire.

There is, however, a fallacy in the above reasoning. When there is a growth of connective tissue-corpuscles in the fibrous structure of the valves—lighted up by the acute inflammatory storm which has passed over the endocardium, but persisting after the storm itself has passed away—it is desirable that the vascular system be kept as quiet as possible; so as to avoid all strain on the inflamed valves. To get the patient up and to administer tonics is to increase the blood-pressure within the heart and arteries; and with them the pressure upon the intra-cardiac valves. The rational treatment is to keep the patient in bed a week at least after all inflammatory symptoms have passed away: and to give chloral or other vascular depressant, to keep the blood-pressure low. A few days more or less in bed is of little consequence compared to a mutilated valve and a crippled existence.

§ 138. In the first place, in an organ acting so purely mechanically as the heart it is absolutely necessary to reduce to a minimum the demands upon it. In order to do this most efficiently a brief rest in bed for a day or two is desirable at the commencement of the treatment in most cases. If the case be an advanced one, the rest in bed must be more prolonged, and all exertion avoided, including straining at stool; this last is of great importance. The gradually failing heart, losing ground day by day under the necessity for exertion, will commonly, when the individual is put to bed, commence to regather strength and force; as is often seen in hospitals, without any other treatment being adopted. If the condition be such as to permit of exertion, and the sufferer must make a living, then the lightest form of labour should be chosen. But in making the selection it must not fall on a form of labour which, though light in the main, is apt at times to call for severe effort. That is very pernicious. The effect of rest in heart affections is such that there is a very painful difference in the prognosis according to the circumstances of the patient; the inequality between rich and poor is here very vividly demonstrated. A very common cause of strain upon the weakened heart is that of running to catch a train or omnibus, especially with a bag in hand. With elderly persons such exertion is frequently fatal at the time. In other cases persisting dyspnœa on effort is so produced, and the effects remain often for weeks.

Not only is labour to be avoided, but anything which tends to tax the powers must be shunned. A debauch is very objectionable; and the question so frequently put to one, about a sufferer from organic disease of the heart, "may he, or she, marry?" must ordinarily be answered in the negative—except in those cases of valvular disease where the valvulitis was acute, and there exists no tendency in the valvular mischief to progress. But in the contracting or progressive forms of valvulitis marriage is contra-indicated. Mental strain and anxiety are also to be avoided, and the cares of business are injurious. If the disease be pronounced, the sufferer should be ordered to quit business; and this may be insisted on with less compunction, as any grave disease of the heart enfeebles the intellect, and renders the brain incapable of sustained effort.

All intercurrent maladies should be carefully attended to, as much less is sufficient to kill the patients than is the case in healthy persons. Thus all acute ailments test the system, especially if they are affections of the respiratory organs; in which case the right heart is very apt to become exhausted. All and every form of disturbance and source of irritation must be done away with as far as possible. Botkin, of St. Petersburg, says that the severe Russian winter is very trying to patients with heart disease, and recommends a milder climate in winter. A similar change would be good in the case of the inhabitants of the colder regions of North America. The same writer tells of the irritation caused by a floating kidney, and insists strongly on the disturbance in the heart's action occasioned by any coexisting ailment. In females, affections of the reproductive organs should always be attended to, and they are common in sufferers from heart disease. Herniæ should be kept well attended to by trusses and other surgical implements. The condition of the intestinal canal should always be carefully watched, and any disturbance of the health should be attended to at once. There is one point, however, to be well minded, and that is not to interfere with discharges too diligently; they are often modes of relief to the congested venous system. Thus hæmorrhoids frequently are a means of much relief; and the absence of bleeding is, in many subjects, accompanied by attacks of dyspnœa, which pass away on the return of a little bleeding from the piles.

Also a certain looseness of the bowels is often to be encouraged rather than checked; it relieves the portal circulation. No rules of thumb can be dogmatically laid down for the treatment of such intercurrent ailments; each must be made the subject of deliberate thought, and the decision formed accordingly.

§ 139. As has been said before, in disease of the heart the tendency is for the veins to become too full of blood, while the arteries are but insufficiently filled. The more marked the disease the greater the tendency to venous congestion. This, however, varies much, according to the form and locality of the disease. In aortic disease, so long as the walls of the left ventricle are sufficiently hypertrophied and structurally sound, and the mitral valve is not secondarily affected, venous congestion is not present; and the mode of relief now under consideration is not indicated. But under all other circumstances much relief may be afforded by unloading the venous congestion. This is often done by spontaneous catharsis; and purgation is a much more valuable measure in the treatment of heart disease than is commonly credited. The relief afforded by free catharsis more than compensates for any exhaustion that it produces and the different effect of several copious discharges from the bowel in a healthy person and one suffering from venous congestion is very marked. Forty-grain doses of compound jalap powder at frequent intervals, or some cathartic equivalent, produce excellent results. The possibility, however, of partial syncope should be kept in mind, and alcohol and diffusible stimulants should be at hand, in case of any emergency.

Relief is often furnished by diaphoresis, and this means of relieving venous congestion may be resorted to at times with advantage. The form of diaphoretic best adapted to heart cases is that of the application of heat externally. The bath, however, should be such as not to include the head and nostrils; Turkish baths are as a rule objectionable. Those baths by which a patient may be sweated in bed or in the bedroom are the best; and Simpson's bath may be used in the humblest households. But diaphoresis is best suited to those heart cases which are complicated with renal disease—a very large class—and in this respect it resembles puncture, or tapping. In pure heart cases

punctures do nothing but harm; in the dropsy of combined heart and kidney disease they may be useful.

The sodio-salicylate of theobromine is a fairly useful cardiac tonic and diuretic. It may be given in doses of from forty-five to sixty grains in the twenty-four hours. It is of more use in diseases of the heart and of the blood-vessels than in acute nephritis.

Diuretics have always been held in high repute in the treatment of dropsy; and an increase in the bulk of urine passed is ever hailed as a good indication, not only by the scientific physician, but by the laity generally.

The question of diuresis in cardiac dropsy is so bound up with an increased arterial tension and a more powerfully acting heart, that it must be included in the consideration of the means of acting directly upon the heart—a subject to be reviewed at some length immediately.

In the attacks of dyspnœa which are so common in the course of disease of the heart, and especially valvular disease, large hot poultices of linseed meal faced with mustard, and applied over the front of the chest and betwixt the shoulders, are often most serviceable. The good effects are produced in two ways. One doubtless is the effect of the heat and mustard together in dilating the cutaneous vessels of the trunk, and in so doing lessening the venous congestion and engorgement of the right ventricle; and so practically affording the same relief that is obtained by venesection, without, however, the loss of blood. The second is the effect of the warmth upon the heart directly. All those who have seen the effect of warmth upon a frog's heart when becoming motionless in diastole, will have no difficulty in understanding this second factor.

§ 140. We have now come to the means of acting directly upon the heart—one of the most important matters of modern therapeutics. By increasing physiological knowledge and careful clinical research, combined with more accurate observation, we are beginning to learn something of the means of acting directly upon the heart and increasing the vigour of its contractions. The chief agent which we use for this end is digitalis. This drug has a notable history, and perhaps more than any other marks the passage of therapeutics from the regions of empiricism

to the surer ground of the domains of rational medicine. Additional interest has gathered round it from the antagonistic opinions which have been and are still held by some as to its real action. In past days, when palpitation of the heart was held to be over-action of the organ, and hypertrophy was a disease to be subdued by active measures, digitalis was held to be a cardiac sedative, because it allayed the palpitation. It received the name of "the opium of the heart." Nothing can be more assured than the fact that palpitation may usually be subdued by its use. But we now know that palpitation is—except in its neurosal forms—the outward visible sign of cardiac embarrassment, an active indication of debility indeed; and that hypertrophy is a conservative and compensatory growth, to be encouraged rather than otherwise. Consequently the old ideas of the way in which digitalis produced a quieter action of the heart have been abandoned; and truer views of its action have taken their place. So early as 1785, Dr. Withering had observed that as a diuretic it was of little avail in persons with a tight and cordy pulse. "On the contrary, if the pulse be feeble or intermitting, the countenance pale, the lips livid, the skin cold, the belly swollen, soft, and fluctuating, or the anasarcous limbs readily pitting under the pressure of the finger, we may expect the diuretic effects to follow in a kindly manner." Sir Henry Holland thought that "the enlarged and flaccid heart" was the condition in which digitalis was most valuable.

The drug most closely allied in physiological action to digitalis is strophanthus, for the introduction of which we are indebted to the genius of Prof. T. R. Fraser of Edinburgh. It and its active principle strophanthin are now largely employed in the place of digitalis.

No doubt, increased digitalis excites contraction of the muscular walls of the heart. The ventricular systole is rendered more perfect, and the beats of the heart are reduced in frequency. The diminution in the frequency of the heart's beat under digitalis always means an increase of the period of the dilatation of the ventricles. Pulse-traces readily show this. The consequence is that the heart's brief sleep is lengthened; and the addition thus given to its aggregate rest in twenty-four hours is considerable. This is one point of much importance.

Another is, that by its effects upon the peripheral arterioles the outflow of blood from the arterial system is checked, and the arteries are better filled with blood. This arterial fulness produces a general effect on every part; it fills the brain with blood, while it increases the blood-pressure upon the glomeruli of the kidneys, of which the increased flow of urine is the outward visible sign. The heart itself partakes of the advantages derived from the arterial fulness; especially as the aortic recoil is the propelling power into the coronary arteries. The increased arterial tension produces a better flow of arterial blood to the heart itself: and betwixt a longer sleep and a better nutrition the heart often recovers its lost power and regains its normal condition. By such means, together with hæmatics, we can build up artificially a conservative hypertrophy where Nature, single-handed, is unequal to the effort. Reducing the call upon the heart by enforced rest; improving the quality of blood by appropriate measures; and procuring for the heart a longer sleep and a better supply of arterial blood; are the means by which we can enable a failing heart to recover itself; and postpone the evil day when recovery is no longer possible.

In no class of diseases has there been so much improvement wrought in treatment by physiological research as in the diseases of the heart. In valvular affections we can do much to compensate the mischief done by fostering muscular hypertrophy. In stenosis, by increasing the driving power, we can have an equal quantity of blood passed through a narrowed opening in an equal time, and thus the equivalent of a cure reached;—as long as that hypertrophy can be maintained in structural integrity. In regurgitation we can partly arrest the backward flow by increasing the blood-pressure, and by developing the muscular walls of the chambers, behind the lesion. In cases of simple dilatation of the heart we can often restore the chambers to their normal size; and even when that is not attainable we may induce hypertrophy, and so stay the dilating process: we can build up hypertrophy, and so endow the dilated heart once more with power. These are not day-dreams, nor the creations of a vivid imagination; but the sober facts of real life.

§ 141. There is one apparent objection to be raised to the

use of digitalis in cases of cardiac debility, and it is this: if digitalis contract the peripheral arterioles, and so raise the blood-pressure in the arteries, the weak heart has a greater resistance to overcome. This seems a grave objection; but in reality such objection does not exist. One of the sensory nerves of the heart is the vaso-inhibitory, or depressor nerve; and when the heart becomes distended in its adynamy, this nerve is, in all probability, thrown into action and the terminal arterioles are dilated. If this latter condition were not affected by digitalis, the blood pumped more vigorously into the arteries by the renovated heart would still very readily escape out of them and the condition of arterial fulness would be unattainable—which after all is what we chiefly wish to obtain. The action upon the peripheral vessels is as important as the action upon the heart; and the effect of the digitalis is to restore the dilated arterioles to their normal calibre, not to set up a condition of arteriole spasm. The digitalis probably only counteracts the condition produced by the vaso-inhibitory nerve being thrown into action. In those cases where it is desirable to increase the action of the heart without much action upon the arterioles, atropine is to be preferred to digitalis.

Another ideal objection is that of the cumulative action of digitalis. We hear comparatively nothing of it now in the works of those who have given attention to the drug: it figured conspicuously in the writings of those who gave digitalis as a cardiac depressant. It is conceivable that by repeated doses of this powerful agent, in conditions of cardiac hypertrophy, dangerous, and even fatal toxic symptoms might be induced. But surely it is rather hard that the drug should bear the blame which really attaches to lack of judgment. If a drug is given in such doses that it is taken into the system faster than it is given out, there will be an accumulation of it in the system, and toxic symptoms induced; but that surely is no unique action pertaining to digitalis. The cumulative action of digitalis, as ordinarily described, has been greatly exaggerated. If the administration of digitalis does not overrun the capacity of the kidneys to eliminate it, all risk may be avoided. The continuous use of small doses is the best plan of treating chronic disease.

§ 142. Digitalis is useful in cases of cardiac adynamy for the relief of the symptoms and consequences of such heart failure. This is well seen in the relief afforded by it in the free bronchial flow found in advanced mitral disease. In no class of cases is there such unanimity of opinion as to the good effects to be secured by digitalis as in mitral disease: and yet if this flux were really the measure of the congestion of the pulmonary vessels, digitalis ought to increase it. As a matter of fact, however, it does not do so; indeed, it is a most efficient measure for the relief of this condition. The flux comes from the distended bronchial veins—is part of the general venous congestion: the inosculations betwixt the pulmonary and bronchial veins being not nearly so complete as some suppose.

In cardiac dropsy digitalis is serviceable when given in full doses. In conditions of heart failure and unfilled arteries, where the small bulk of urine is the indication of a low blood-pressure; then digitalis becomes a most powerful diuretic. Here it acts rather by its effects upon the circulation than by its action upon the vessels of the kidneys. As the falling off in the bulk of urine is one of the gravest symptoms of increasing advancing heart failure; so increase in its bulk is hailed as an indication of improvement. Even those who have still their doubts as to the action of digitalis upon the heart, admit that its effects are most gratifying when there is a good flow of urine induced by its administration. The explanation is obvious. In many cases real and true diuretics may be required, as in cases where the action of digitalis in increasing the blood-pressure is also absolutely necessary; and then digitalis may be combined with compound spirits of juniper, or nitric æther, or buchu, with advantage.

In simple cardiac debility with scanty flow of urine the following is a pleasant combination:—

Tinct. Digitalis, ℥x.
Sp. Æth. Nit. ℥ss.
Inf. Buchu, ad ℥i. ter in die.

At other times potash in any of its forms, but especially the citrate, may be added to this mixture. In cases where there is

atonic gout combined with heart disease, or with debility, potash and iron with digitalis are indicated.

Pot. Bicarb. gr. x.
Fer. Am. Cit. gr. v.
Tinct. Digitalis, ♏x.
Inf. Buchu, ℥i. ter in die,

to be followed by a good draught of water, and taken half-an-hour before meals, is a prescription in constant use in hospital practice. In acute anæmia, with palpitation, digitalis may be given with ammonio-citrate of iron (grs. v.), with or without five grains of carbonate of ammonium. At other times digitalis may be given with astringent per-salts of iron, the perchloride, the pernitrate, or the persulphate; the little discoloration which follows forming no valid objection to the combination. In the complex condition of cardiac debility, gastric catarrh, copious eructations of wind, and inactivity of the bowels, so commonly found together in chronic heart disease, digitalis is best given in pill. The following prescription is useful:—

Pulv. Digitalis, gr. xxx.
Fer. Sulph. Exsic. gr. xv.
Pulv. Capsici, gr. xl.
Pil. Al. et Myrrh, ℥ii. M. fiat.
In pil. lx. div. 1 bis in die.

In coated pills the medicine may be continued for months without the stomach rebelling. In this form it can also be carried about without observation, and does not readily spoil; in this form the iron does not affect the teeth. A pill can be quietly swallowed twice a day after food without trouble or inconvenience.

In cases of advanced dropsy it has been found desirable to apply digitalis externally, as a poultice of the leaves over the abdomen and thighs; and excellent results have followed this use of the drug. In such cases powerful but unmeasured doses of this agent may be absolutely necessary, and there may be no choice; but the cautious and yet persistent administration of the remedy in small doses, along with hæmatics and nutritive food, appears the most satisfactory on the whole. It is well, too, to

give hydrogogue cathartics in persisting dropsy. They do not exhaust, but really give great relief. In many cases of cardiac dropsy great improvement has followed the administration of cathartics. Nevertheless, in certain conditions of acute asthenia, or anæmia, it must be given more freely. In states of cerebral anæmia it raises the blood-pressure, and so fills the cerebral vessels. The symptoms of cerebral anæmia, including even delusions, will be relieved by its use. In delirium tremens it has been found useful in full doses; but it is when the pulse is fast, irregular, and feeble that its good effects are most apparent. Where there is insomnia and much restlessness it may be advantageously combined with full doses of bromide of potassium. The correct understanding of the action of digitalis; of the class of cases to which it is suited; and those where its use is contra-indicated; form a subject upon which every practitioner and every student ought to have definite and distinct ideas; that is, if he wish to hold his own in the present arduous struggle for existence.

When there is much ascites it is usually necessary to tap the patient at once. When this has been done the following pill should be administered:—

Powdered digitalis, half a grain.
Squill, one grain.
Blue pill, three grains.

One pill should be given at bed-time, and its use should be continued until there is a free action of the kidneys.

§ 143. The different measures detailed above for the relief, and even, in more fortunate cases, cure of primary heart diseases, must all be supplemented by a liberal supply of nutritive and easily digestible food. This combination is most necessary. The food must be nutritive, else the improved tissue-nutrition—we wish to bring about—will not be secured; and our good intentions will fail to attain permanent benefit for the sufferer; the good we succeed in doing will be temporary and evanescent. If nutrition be defective, cod-liver oil may be given with advantage, when the stomach will tolerate it. The food should be given in small quantities at once, and at frequent intervals; and the appetite, if defective or capricious, may be stimulated by

vegetable bitters, either taken in addition to, or as the vehicle for, the other remedies. Digestion may be aided by small doses of alcohol; but it is a good rule to regulate the amount of alcohol by its power to aid in the assimilation of food: so long as it increases assimilation, it is good; when it diminishes it, it is injurious. Broadly stated, we may say that alcohol is indicated rather during the times of acute failure, than as a permanent part of the dietary in heart affections.

Then the food should be easily digestible. Little need be said upon this head. If it be not so, then indigestion is readily induced, and added to the other troubles. It must be ever borne in mind that in heart failure there is a marked tendency to venous congestion, and that this is especially felt in the valveless portal circulation. The viscera in connection with the portal circulation share in the venous congestion; and amongst others the stomach. There is a flow of mucus, which forms gastric catarrh; and gives rise to that sense of fulness of which heart sufferers so constantly complain. The venous congestion, too, obstructs the flow of blood through the stomach when the arterioles dilate in the act of digestion; and so interferes with the free secretion of gastric juice. The food should be of such a quality and in such a form that it shall tax but little the enfeebled stomach. It is further obvious that any improvement in the circulation generally will be felt in the stomach. There is also another matter in connection with the question of food in heart disease; and it is this. The heart is only separated from the stomach by the thin diaphragm; and any accumulation in the stomach, no matter whether solid, fluid, or gaseous, presses up the diaphragm, and, diminishing the thoracic space in which the heart beats, gives rise to very unpleasant sensations—not rarely forming grave attacks of dyspnœa and palpitation. Especially is this the case when the right side of the heart is taxed and failing. In the same way distension of the colon affects the heart. These attacks are most common when the patient is in the recumbent posture; apparently because then the contents of the abdomen press more against the diaphragm; from which they tend to fall away by their own weight when the erect posture is assumed. Supper with such patients should ever be light, and taken some hours before going to rest. The

morning meal may be more substantial in character with impunity; or a small quantity of fluid food may be taken towards morning. It is always important to prevent flatulent dyspepsia, not only by careful dieting, by the administration of gentian and soda, bismuth, oil of cajeput, and the occasional use of some such combination as the following:—

Oil of Cajeput, one drachm.
Oil of Cloves, one drachm.
Oil of Peppermint, one drachm.
Alcohol to two ounces.

Ten drops taken on sugar or on the crumb of bread will usually afford speedy relief (Murrell's *Pharmacology*).

Such are the broad principles of the treatment to be pursued when the heart is itself affected primarily. A large portion, however, of the cases of heart affection, for which relief is sought, are not true ailments of the heart; but really secondary affections of it—consequent upon some disturbance in the circulation. They can now be considered after the actual affections of the heart have been reviewed.

§ 144. The secondary affections of the heart may be defined as more or less complete heart failure, due to a rise in the arterial tension. It is clear enough that a rise in arterial tension may occur where the heart is not structurally sound, and then the effects are very serious, as in angina pectoris; which is often fatal when it occurs in a patient whose heart is structurally unsound, and whose coronary vessels are much diseased. But the complaint itself is due to an increased arterial tension as demonstrated by the sphygmograph, occasioned by arteriole spasm. Such drugs as nitrite of amyl and nitro-glycerine speedily afford relief in these conditions. The effect of nitro-glycerine on the condition of the blood-vessels is much more lasting than that of nitrite of amyl. "In the case of nitrite of amyl the effect is obtained in from fifteen to twenty seconds after an inhalation, but its influence is transitory, a tracing taken a minute and a half after the exhibition of the drug being perfectly normal. In fact, the full effect of nitrite of amyl on the pulse is not maintained for more than fifteen seconds. The nitro-glycerine produces its effects much more slowly, but

they last longer and disappear gradually, the tracing not resuming its normal condition for nearly half-an-hour. The effect may be maintained much longer by repeating the dose" (Murrell, *Nitro-glycerine in Angina Pectoris*). In the form of angina pectoris—the true angina vaso-motoria of Nothnagel and Eulenberg—the effect of an increased arterial tension upon the heart produces a terrible and well-marked disease. In the less perfect and more obscure forms the effects upon the heart are much more frequent; though less readily recognizable, and consequently less generally understood. Now, however, that the secondary affections of the heart have come within our diagnostic ken, they are found to form a large portion of the heart affections in which no organic disease is present. The evidences of cardiac embarrassment are exhibited; but without the witnesses of organic change.

It is needless to say that up to a very recent period these cases were but imperfectly recognized; and though the vague diagnosis of gout at the heart led to a fairly correct line of treatment in those who were obviously gouty; in those whose gout was not apparent an imperfect diagnosis led to a less successful practice. These cases formed a class of their own, very troublesome and very intractable until their nature was detected and their pathology correctly interpreted. Now, however, it has become possible to recognize these cases, and, what is more important to the patient, to treat them satisfactorily. Here the palpitation, the irregularity, or intermittency, with their subjective symptoms, are not to be treated so much by measures intended to invigorate the heart, as by the removal of the condition on which they causally depend: that is until the heart has begun to palpably fail. The state of the arteries must be our guide in treatment: where they are tense and tendinous to the touch, then the line of treatment is distinctly to lower the blood-pressure in the arteries. The reader must bear in mind, however, that an atheromatous condition of the arteries exaggerates the pulse, and so often misrepresents the actual condition of the heart: especially is this the case in the failing hypertrophy of "the gouty heart."

In this class of cases the cardiac troubles are the consequences of a heightened arterial tension interfering with and opposing

ventricular contraction, and the removal of this abnormal tension is indicated. It again rests causally upon an obstruction in the peripheral arterioles, taking its origin in the presence of excessive nitrogenized waste. To remove this waste is our obvious duty, and forms the only means of approach to successful treatment. For this end two things are requisite:—(1) To remove the waste; and (2) to prevent its production. For the attainment of the first end we resort to agents which increase the activity of the kidneys and the other depurating organs, the skin and the bowels. These ends may be attained by the use of diaphoretics, cathartics, and diuretics. The diuretic here to be selected is not an agent which will increase the bulk of urine so much, as one which will increase the amount of solids in the urine. We desire to cleanse the blood of its nitrogenized waste; and in doing so, must remember that the most permanent form such waste assumes is uric acid, or the urate of soda or ammonia. These are all but imperfectly soluble salts, whereas the urates of potash and of lithia are freely soluble. Consequently we must administer these agents, and, by so rendering the waste soluble in the blood serum, permit of its escape by every water emunctory. The various natural waters which contain potash are here valuable; and especially so if they are purgative as well. As medicines, the *potus imperialis* and the bitartrate of potassium in barley-water, are useful, and may be taken freely to the point of purgation. When more concentrated medicines are prescribed, it is a matter of the first importance that each dose be accompanied by large draughts of water, so as to imitate the natural waters; this makes them much more effective. A good form of mixture is furnished by the following combination:—

Pot. Iod. gr. v.
Pot. Bicarb. gr. xv.
Inf. Buchu, ʒi. ter aut quater in die.

This should be taken on an empty stomach, and washed down with a tumblerful of water. If the pulse be strong and incompressible, and the first sound of the heart good, then ten drops of colchicum wine may be added with advantage. If, however, the pulse be compressible and the heart's contractions lacking

in power, as where there is dilatation and not hypertrophy of the left ventricle, then as many drops of digitalis may be substituted for the colchicum; this will maintain the vigour of the heart under the depressant action of the alkalies. Under a line of treatment of this kind secondary affections of the heart will progress more satisfactorily, both for patient and practitioner, than under the plan of strengthening the heart by the usual measures. When digitalis and iron are given alone for the treatment of affections of the heart which are really secondary in their nature, the results are either no relief, or even a more marked condition; not uncommonly a hard hammering of the heart against the chest walls, the consequence of its inability to struggle successfully against the opposing arterioles and the obstructed blood-flow. The treatment here rests very obviously upon a clear and distinct diagnosis. The use of nitrite of amyl inhalations in such cases is indicated.

The relief afforded to the heart by the line of treatment just given is often most marked; and the combination of the iodide and bicarbonate of potassium may often be changed to that of iron and potassium with advantage, after a few days. The gradual progression from an alkaline to a purely chalybeate and tonic treatment, by means of a compromise, is desirable, and furnishes the most satisfactory results.

In addition to these measures, alkaline purgatives, as seidlitz powders, those of the Hunyadi Janos water, or that of Marienbad, or Saratoga, or Hathorn waters, are very useful adjuncts; especially if there be any overt evidences of gout manifesting themselves. Such purgation, along with colchicum, is often advantageous.

To fulfil the second indication, it is necessary to regulate the diet. Slops, bland fluids as milk and seltzer-water, or arrow-root, or sago, variously flavoured, should form the dietary. Nitrogenized foods, as meat, soups, and beef-tea, whose use often passes into abuse, are to be withheld; during the early part of the treatment at least. Nowadays it is fashionable to resort to beef-tea in season and out of season; and to ignore the fact that its nutritive power is low, the amount of nitrogenized matter comparatively high, while most of it is too far advanced to undergo anything but retrograde changes. Of extract of beef

this last is still more true; and its value as a food is almost *nil* —it is an agreeable stimulant. Light puddings, as tapioca or vermicelli, and white fish, with vegetables or fruits, should form the diet for some time; and it is only when the brunt of the affair is over, and the consequent debility is the chief matter to be attended to, that a more liberal dietary is indicated. For some time, however, the alkaline, and often the mixed alkaline and chalybeate treatment, must be continued after convalescence is established.

The success which attends the treatment of secondary affections of the heart by measures which would prove but simply disastrous in primary affections of that organ, being, as they are, direct depressants, is all that is required to vindicate the diagnosis, and to justify the separation of heart affections into the divisions made above. Of course if there is present some primary debility, or organic disease of the heart, then a complex treatment must be adopted to meet a complex malady.

It is to be regretted that the division here given is not more generally and universally recognized. Not only would patients benefit thereby; but those differences of opinion as to the existence of actual heart disease in these cases, which constitute one of the opprobria of our profession, would be avoided. In cases of secondary disease of the heart, exercise and effort, so objectionable and injurious in primary heart disease, may be indulged in not only without injury, but with advantage. The attacks of cardiac embarrassment in these cases are not associated with effort; while exercise, by leading to more perfect oxidization, tends to diminish the amount of uric acid in the system. When the hypertrophied heart is failing, effort affects it, and digitalis is indicated. When the spasm of the arterioles is acute, angina pectoris is set up. For its immediate relief a few drops of nitrite of amyl may be placed on a handkerchief and inhaled; or better still, nitro-glycerine may be administered. The relaxation of the arteriole spasm gives relief. No evil result ensues from the use of either agent. In cardiac neuralgia, arsenic and the vegetable tonics are useful.

§ 145. Another division of affections of the heart is that which may fairly be denominated the neurosal.

Many conditions produce an abnormal working of the heart,

especially in persons of a nervous diathesis, or in those reduced to an anæmic or debilitated state; there are also other conditions which also give rise to palpitations and disturbed action of the heart.

In persons of a nervous diathesis hysterical palpitation is common. It is due apparently to a contracted condition of the arterioles; and in some persons there is a certain amount of hypertrophy produced in time. The subjects of this class of ailments are usually women, mostly spinsters, and but comparatively rarely mothers, and there is not unfrequently an ovarian element in the case. Bromide of potassium with iron, and the external application of a belladonna plaster, are the measures best suited to this division of heart ailments. The occupation of the mind in some useful work is also very desirable.

It, however, happens that in some cases the affection is distinctly neurosal, and yet it is in no way related to what we term hysteria. Here quinine and iron, with strychnine, form a suitable measure to be adopted. Such an affection is often associated with constipation or abdominal fulness, and this should be attended to forthwith. Botkin, of St. Petersburg, advocates the use of nitrate of silver in cases of cardiac irritability; and recommends at the same time, the relief, or better still, the removal of every form of co-existing or inter-current malady which may possibly form an exciting cause of this irritable action. The palpitation which co-exists with prolapsus of the womb is at once greatly relieved on the womb being properly replaced, and without it the ordinary treatment is inefficacious. Frequently excited action and palpitation are found in women associated with an irritable condition of the ovaries.

It must never be forgotten, however, that irritability of the heart is most commonly associated with indulgence in two neurotic poisons, tea and tobacco. The first is very common in women, very common indeed; while the second is far from uncommon in men; indeed the ailment is denominated "smoker's heart." For the successful treatment of these neuroses the removal of the exciting cause is the first and most necessary step. A little careful attention to the case will usually determine it to belong to neither of the preceding divisions: so that

it falls by exclusion into this last class. The action of the heart in these cases is irregular in force and rhythm, and there are attacks of palpitation at intervals; as also times when the heart's action seems to be temporarily arrested. In these cases the favourite neurotic must be abandoned, or its use much restricted; and the general health must be attended to. The results of treatment will usually speedily allay any apprehensions which may exist as to the possibility of actual organic disease of the heart.

At other times a similar condition of the heart will be found in connection with much indulgence of the generative instinct; and here restriction, with attention to the general health, is necessary.

In all these cases the rules and principles of treatment are to be arranged according to the exigencies of each individual case. In the treatment of neurosal affections of the heart many authorities speak highly of opium. Unfortunately they have not sufficiently discriminated the cases in which it may be resorted to with advantage to furnish any rules for its use. In actual disease its use is inadmissible; and the late Hyde Salter denounced, with much eloquence, the administration of opium in the distressing insomnia of advanced heart disease. Here its use is simply fatal. It is all the patient can do to maintain respiration by the most energetic voluntary efforts: arrest those efforts by opium, and the patient will sleep—but it will be the long dreamless sleep which knows no awakening.

§ 146. "Irritable heart" is the term Da Costa has aptly applied to a large series of cases of disturbance of the heart which first attracted his attention in the American civil war. His observations are founded on three hundred cases of soldiers in the army of the United States, who were called from civil pursuits into active military life with little or no preliminary training. It was found that they were subject to attacks of palpitation, to severe pain in the chest, of a sharp and stabbing, or of a dull aching character, and to dyspnœa on exertion, so that they were unable to carry their accoutrements, or to keep up with their comrades. He says: "The general clinical history of many of these cases was this:—A man who had been for some months or longer in active service would be seized with diarrhœa,

annoying, but not severe enough to keep him out of the field: or, attacked with diarrhœa or fever, he rejoined, after a stay in hospital, his command, and again underwent the fatigues of a soldier's life. He soon noticed that he could not bear them as formerly; he got out of breath, could not keep up with his comrades, was annoyed with dizziness and palpitation, and with pain in the chest: his accoutrements oppressed him, and all this though he appeared well and healthy." It was not connected with indulgence in tobacco or the injurious agents just alluded to above; though they aggravated the mischief and kept it up. It would appear that the ailment was induced by some intercurrent depressing affection, showing itself in a person previously subjected to excessive demands upon the powers. In such cases the heart becomes disturbed and enfeebled, and this condition of it is apt to be persistent and intractable to treatment. Da Costa has carried his investigations on this subject into other fields of inquiry, and has found that excessive exertion is apt to induce a disordered heart. This is especially the case amidst those who lead a high-pressure life, and who are also mentally much engaged. We cannot be surprised that heart ailments—if not actually heart diseases—are growing more and more frequent, and that they will continue to grow in frequency. These are important subjects for our consideration in the matter of prevention as well as cure: this class of ailments is a growing one, as well as a difficult one to treat successfully. In cases where there is little or no anæmia, digitalis, especially with bromide of potassium, is indicated in small but continued doses. A belladonna plaster might be employed externally, or even some counter-irritation resorted to. Rest, quiet, good food, bracing atmosphere, and cheerful surroundings are all desirable adjuncts to the strictly medical treatment in these cases. Much of the cardiac disorder we are called upon to treat presents many of the features of this "irritable heart,"—often associated with the consumption of much lean meat, under the impression that there is debility present which must be met by nourishing food—and the treatment must be directed to the different factors of the case. When the case is complicated with imperfect blood-depurations, this last must be attended to and corrected. Irritable heart is certainly becoming more common.

In our experience it has occurred most frequently among doctors themselves. Men of a neurosal temperament and in large practice: men who carry a part of their patients' cares as well as their own.

§ 147. At other times there exists a tendency to palpitation, especially on effort, with accompanying dyspnœa, in young persons, mostly females. In this class of cases there is also pronounced anæmia. There are venous hums and very often a systolic bruit, aortic, or more often pulmonary. The hæmic murmurs cause these cases not uncommonly to be mistaken for organic disease of the heart; and much uncalled-for anxiety and alarm are occasioned thereby. At other times with anæmia there is a dilated condition of the left ventricle with mitral regurgitation. The latter disappears as the ventricle (and with it the mitral ostium) regains its normal dimensions. Whatever the cause of the anæmia, whether imperfect food, impaired assimilation, or an exhausting drain, the exciting cause must be removed; and good food, tonics, and chalybeates must be given. The treatment of the anæmia is the treatment of the cardiac trouble; and the heart itself is not to be treated, unless a belladonna plaster be indicated by persistent palpitation. In these cases it is often well to put the patient to bed for a week or two at the outset of the treatment.

Fatty degeneration of the heart must be distinguished from fatty disease of the heart. The heart may be free from any accumulation or deposit of fatty tissue, although its substance may be pale, soft, and flabby. This condition is met with in pernicious anæmia, luchæmia, Hodgkin's disease. It may be produced artificially by the administration of toxic doses of phosphorus, vanadium, arsenic, and some other drugs. The symptoms it produces are somewhat obscure, but lividity, irregularity of the pulse, and dyspnœa on exertion are not uncommon. The first sound is usually accentuated, and its booming character is lost so that it resembles the second sound. It may give rise to fatal syncope.

Rupture of the heart is rare, and is chiefly of pathological interest. It will be remembered that George II. died from this condition at the age of seventy-six. It is commonly the result of violent exertion in old people with degenerate cardiac tissue.

Such are the different morbid conditions of the centre of the vascular system and their indications for treatment, so far as they permit of being sketched out in this brief manner. In no ailments whatever does the successful treatment rest more distinctly upon the accuracy of diagnosis—not only as to the exact pathological condition, but as to its why and how, and as to the general conditions with which it is associated. Take the condition so commonly found, viz. dilatation with some hypertrophy. It may occur in a young man who has persistently overworked himself; where it is readily amenable to treatment. It may be found in a middle-aged woman, who has had it for years, and in whom palliative treatment is fairly successful; but where anything like cure is out of the question, though life may be preserved for a long time. Finally, the dilatation may indicate the yielding of an hypertrophied heart, whose structure is being cut down by advancing fatty degeneration, and the indications so furnished point to a hopeless downward course—but little affected by treatment in most cases, and with the inevitable end not far distant. It is obvious that it is of the utmost importance to discriminate betwixt these similar but really unlike conditions; to be able to distinguish those cases which admit of being benefited by treatment, from those that do not. In palpitation, too; how different are the measures to be adopted in the palpitation of muscular failure, and in the neurosal palpitation with unfilled vessels which is common in girls, and where there seem to be a discharge of accumulated energy in the cardiac ganglia. The man whose creed is that heart diseases are not to be improved by treatment is not likely to be successful in his practice; the man who does not discriminate his cases will also bring much discredit upon measures which are signally useful when properly employed; but powerless, if not actually mischievous, when misapplied. It is to be trusted that the reader will belong to neither division; but will be one of that rapidly growing class who recognize that the treatment of heart affections is often most satisfactory; and who further develop their usefulness by educating themselves to detect and distinguish those cases which admit of treatment; and who are also learning how best to treat them: and so are enabled to separate a large class of affections ad-

mitting of beneficial treatment, from another class of maladies for which little or nothing can be done—except in the way of euthanasia.

Pericarditis is rarely idiopathic, and is usually secondary to either acute rheumatism or Bright's disease. When it is acute it gives rise to marked dyspnœa, or there may be maniacal excitement. Apoplectiform seizures or convulsive attacks are usually due to embolism of the cerebral vessels from the accompanying endocarditis. The diagnosis of pericarditis with effusion if at all extensive presents little or no difficulty. The patient should be examined as little as possible, and should be kept absolutely at rest. Blistering, or the application of leeches often affords relief. Adherent pericardium as an after result is not uncommon. It is of more importance in children than in adults, for it may prevent the proper development of the heart, and lead to weakness of the circulation with its attendant arterial anæmia and venous congestion.

The only other ailment of the vascular system, not cardiac, of which it is necessary to say anything here, is aneurysm. Here a certain portion of the wall of the elastic arterial system is weakened and impaired; and a sac is formed, which sustains the same pressure as the arteries generally. If the blood-pressure be high, the aneurysm is prominent and pulsates powerfully; if the blood-pressure be lowered, the aneurysm recedes and its pulsations are less distinct. It is obvious then that the best means of avoiding rupture of the aneurysmal sac is to keep the blood-pressure low. The well-known plan of Albertini and Valsalva was to starve the patient by hunger and venesection. This lowered the blood-pressure and the patient, both. Now we can lower the blood-pressure by aconite or hydrate of chloral. This is an important part of the treatment. The other part of the treatment is directly curative—to procure layers of fibrine within the sac until it is filled and the aneurysm is cured. For the attainment of this end it has been found useful to administer iodide of potassium. To Dr. Balfour belongs the credit of strongly advocating this plan of treatment first suggested by Graves, in addition to a restricted diet and general quiet. The importance of the latter is obvious. If to this be added small doses of chloral hydrate, a treatment will

be adopted which is theoretically perfect; and further it is practically useful. Of the two factors in the treatment, rest and low diet, the former is much the more important. The patient must not be allowed to sit up in order to take food or to have his bowels moved, and he should be instructed to move his arms as little as possible. The quantity of water taken should be gradually reduced to half a pint in the twenty-four hours, but the thirst may be relieved by sucking small pieces of ice from time to time. The treatment may have to be persevered in for two years.

CHAPTER XV

THE RESPIRATORY SYSTEM

§ 148. By means of respiration the system gets rid of most of its carbonaceous waste, and of a quantity of water, while at the same time oxygen is freely taken up by the hæmoglobin of the red blood corpuscles. In order to admit of these interchanges air is drawn into the thorax; mainly by the sucking power of the diaphragm and intercostal muscles, through the trachea, which divides ultimately into myriads of terminal air-tubes with alveolar dilatations at their termination, over which are spread the pulmonary capillaries. In animals who live in water the respiratory organs float in the fluid, and often are protrusions outwards of the pulmonary vessels. When the respiratory changes are wrought in air, the air is sucked in. In consequence of this the respiratory organs are affected by the temperature of the inspired air; and are also liable to mechanical irritation from minute particles in that air. From the first we get colds; and in the second we find a very effective provocative of tissue changes. The mucous membrane of the respiratory organs is also liable to be affected by general conditions, as the presence of gout-poison in the system. Such are some of the reasons why the respiratory organs are so often the seat of disease. The constant necessity for motion and functional activity in the organs of this system, furnishes an explanation why diseases in them are persistent and often intractable. If the parts could be rested their repair would be wondrously facilitated. When laryngeal disease is about to asphyxiate the patient, tracheotomy not only gives immediate

relief, but commonly leads to the cure of the laryngeal disease. This it accomplishes by the rest it furnishes. That the rest is the curative agent is shown by the fact that if the person upon whom tracheotomy has been performed is a talkative person, the repair is much slower than where more perfect rest is given by taciturnity. The application of the principle of rest to the treatment of disease within the thorax has been successfully attempted. Dr. F. Roberts advocates the strapping of one-half of the thorax, in cases of unilateral disease, so as to render it more immovable; and the results of such treatment are satisfactory. The plan is eminently rational; and has long been practised in the case of a broken rib, where the fractured portion, in the movements of respiration, rubs the pleura into an inflammatory state. The painful or unpleasant sensations produced by exertion in extensive disease of the respiratory organs usually secure for them the modified and partial rest of general quiet.

The irritation caused by inspired particles is the cause of most of the chronic interstitial pneumonia, with dilatation of the bronchi, we so commonly meet with; and which is often mistaken for phthisis with cavities. Tubercle is but a lowly form of tissue-growth; and this condition of cirrhosis differs from that of pulmonary tuberculosis chiefly in the better chance of life it gives. In each case, whether a miller with chronic inflammatory changes in his lungs, or a needlewoman in a garret with phthisis, where smuts, &c., are inspired to the great irritation of the diseased surfaces, we insist upon a change of air. It is not only that an atmosphere largely charged with oxygen in an active form is to be preferred to one which has been breathed and rebreathed until its active oxygen is exhausted, for its general tonic effect; but also that the air of the country, and especially of the sea-side, is comparatively free from the organic particles which act as direct irritants to diseased lungs. Where change of air is not practicable, respirators of cotton-wool, which arrest these particles, are very useful. The hopelessness, which hangs over diseases of the respiratory organs in the poor in towns, is due very much to the nature of the air they breathe, laden as it is with irritant particles—sometimes, too, also irritant by their chemical

qualities, as well as to their systemic deficiencies. Everything is against them!

In consequence of their being the means by which air is respired, the organs of respiration are specially liable to be affected by changes of temperature. We see in the glowing hands of the snow-baller the consequences of a sustained application of cold in the resultant hyperæmia, and when cold air is respired the lining membrane of the turbinated bones, &c., becomes turgid with arterial blood. By this means the air is warmed in its passage into the thorax. The impotence of this warming of the respired air is seen in the tendency to pneumonia in persons upon whom tracheotomy has been performed, unless a warm temperature surrounds them; and also in the tendency to thoracic inflammation in infants after exposure to cold, if they cry and so breathe the cold air through their mouth. Who has ever watched an unhappy infant crying with cold, and seen the unwarmed air entering its thorax, without feelings of keenest apprehension as to the consequences? It is also seen in the fact that when nasal catarrh—itself the consequence of acute hyperæmia—has obstructed our ordinary channel of respiration, and we breathe through the mouth, then inflammation of the lining membrane of the thoracic portion of the respiratory tract is commonly instituted. The exact point when hyperæmia of the air-passages passes into inflammation cannot be defined; and there is a difference of degree only between the rheum from the nose, occasioned by breathing very cold air, and the catarrh of inflammation. The normal hyperæmia occasions the one; the more pronounced condition of inflammation furnishes the other. In the same way the condition of the individual often determines which of these two results shall be produced by a certain amount of exposure. If the individual be perfectly healthy, and the organism be in good condition, then only hyperæmia with its consequences will be induced; if the person be out of health, and the system impaired as regards its resistive and self-protective power, then inflammation and its sequels will be the consequence. The question is one of degree in different individuals, or of times and states in the same individual. If the body be heated by long exposure to a high temperature, combined with exercise, the cutaneous

vessels are full of blood, and heat is rapidly lost on exposure to cold. If that exposure but dissipates the accumulated heat, it is pleasant, and not injurious; but if it be carried further, then such heat-loss may be induced as shall depress the body temperature, and cause a cold, with the subsequent rise of temperature—the catarrhal pyrexia. If the tone of the cutaneous vessels be lost by reason of general exhaustion or tire, such a result is more likely to follow than in the case of an unexhausted person. One who is not quite well, or who has been overworked, will be more likely to undergo much heat-loss on such exposure than a perfectly healthy individual. The general lowering of temperature will determine often whether the hyperæmia of the air-passages shall pass into inflammation or not. Hence the readiness with which the weak and those unaccustomed to exposure catch cold, as compared to the strong and inured.

§ 149. The treatment of an acute catarrh must be conducted on principles which are founded on a knowledge of the pathology of the affection. At first there has been an abnormal depression of temperature, a lowering of the body-heat; then follows a rise of temperature and a pyretic state; this gradually defervesces, and the wonted health is recovered. In our treatment, then, we must aim at aiding these natural processes. If the catarrh could be caught at the outset, then some hot fluids, more or less alcoholic, and a full dose of paregoric, or Dover's powder, at bed-time, and a warmed bed, might be sufficient for the restoration of the patient. More commonly, however, we are not consulted until a more advanced condition is reached; and there is a dry, imperspirable skin, a pyretic state, with a congested condition of the lining membrane of the respiratory tract, in some part of it. There may or may not be any cough. There is always, however, some difficulty in breathing. For the relief of this condition of vascularity, it is necessary to relax the skin, as the old phrase ran; or, in more recent phraseology, to excite cutaneous action, and dilate the cutaneous vessels. It is well to commence with either five grains of James's powder or of Plummer's pill, with or without a grain of opium, at bed-time; and in the morning a seidlitz powder, until a gentle action of the bowels is set up. But much purgation is to be

studiously avoided, especially if the patient is weak, or the attack severe; in these cases the powers must be husbanded, for they may come to be severely taxed, especially if the catarrh be intra-thoracic. There are many patients who catch still more cold from the exposure during purgation, especially in country districts, where there is not a night-chair in the house; this is a matter the young practitioner will do well to heed. The next measures usually adopted in these cases are something of this kind:—

Vin. Antimonialis, ℥xv.
Liq. Am. Acetat. ʒi.

every four or six hours. At other times it may be desirable to give the following:—

Pot. Iod. gr. v.
Liq. Am. Acet. ʒi.

instead of the first, especially where the patient is weak or the system impressionable to depressants. The best household remedy is ipecacuanha wine, which is infinitely less hazardous than antimonial wine; for the latter may be given beyond its emetic action, while large doses of ipecacuanha are free from such danger. If vomiting is induced, it is useful, especially in children. After free action of the skin has been induced, something like the following mixture may be given:—

Ac. Hydrochlor. Dil. ℥x.
Sp. Chloroformi, ℥xx.
Syr. Scillæ, ʒi.
Aquæ ad ʒi., ter in die;

or

Ac. Phosph. Dil. ℥xv.
Inf. Cinchonæ, ʒi.

if there is nasal catarrh only; and when more convalescent, some of the numerous combinations of iron and vegetable tonics already given, may be prescribed.

It is often desirable to inhale steam in affections of the lining

membranes of the respiratory tract; and for this purpose an inhaler may be used, or in humbler homes a jug of hot water. How far the good effects of the steam may be aided by adding medicinal agents to the hot water it is scarcely possible to say. In croup the room should be filled with hot vapours, which produce excellent effects. In croup an active emetic should be administered at once, and then depressant diaphoretics, as antimonial wine, in guarded doses, however, given after; the strength being kept up by free supplies of milk.

§ 150. It may tend to facilitate the consideration of the thoracic affections connected with the respiratory system if the subject be separated into three divisions: (1) the air-tubes; (2) the lung-structures; and (3) the serous coverings: and the ailments of each described generically.

Affections of the air-tubes may be acute or chronic. The acute forms differ but little from the sketch just given of an acute catarrh, and vary from a mere cold to a most dangerous illness. In acute bronchitis, in addition to the measures just mentioned, it is of great importance to keep the chest enveloped in large and hot poultices. They should be repeatedly changed, so as never to be allowed to become cool, let alone cold. They should be large and thick, so as not to require very frequent changes; and the best material for retaining its heat long is linseed meal. In severe cases, where there is much exhaustion, the surface of the poultices may be dusted with mustard. The heat keeps up the action of the heart, especially the right ventricle, which is apt to become exhausted, and by dilating the cutaneous vessels of the trunk relieves the vascular system. Two or three thicknesses of flannel should intervene between the poultice and the skin, so that the poultice may be applied at once. When the poultice must cool till the unprotected skin can bear it, more than half its utility is done away with. The great danger in bronchitis is exhaustion, and in persons at the extremes of life it is a very fatal affection; in strong adults the most severe attacks are compatible with recovery. In addition to these measures it is desirable to resort to some form of expectorant.

Any one who suffers from bronchitis realizes for himself quickly the benefit to be derived from expectorants. These

agents have been arrived at empirically; and are used because they do good. What they achieve is a loosening of the phlegm —that is, the secreted mucus is more easily dislodged, and so expectorated. There is no doubt about that fact. But it is not a matter of indifference which one of the agents known as expectorants be resorted to. In the first stages of the case the bronchial mucous membrane is swollen, congested, turgid, and dry; it is hyperæmic, but secretion is arrested, and the mucus is scanty and tenacious, and got up only with the greatest difficulty. It is obvious that here one part of the treatment must be to relieve the vascular system; to reduce the turgescence, without which free secretion cannot be attained. To give ammonia and senega would not achieve the desired end. The agent to be used must be one which will affect the circulation; which will relax the cutaneous vessels and depress the circulation. Such an agent we find in tartar emetic, in iodide of potassium, or ipecacuanha. The administration of these agents is the line to be pursued until turgescence passes into free bronchial secretion, and a moist condition of the skin is secured; then, and after then only, are the stimulating expectorants to be resorted to. The effect of these remedies, where the first stage is strongly marked and intractable, will be much aided by producing an eruption on the chest: this may be done by tartar emetic ointment, or croton-oil liniment, which are powerful measures for good when skilfully wielded. Even venesection may occasionally have to be resorted to when these depressant measures fail, as experience has taught us. Whatever the amount of pains required to procure relief, the first stage must be got over before the stimulating expectorants are of any avail. It is a good plan never to give squill until the skin is moist and the phlegm loose—it will do no good; you must give ipecacuanha and relaxant expectorants as long as the skin is dry and the phlegm tough. When secretion is free, squill, senega, carbonate of ammonium, benzoin, &c., may be given with advantage. The indications for treatment now are to sustain the system during the exhaustive process of breathing through the obstructed air-tubes and expelling the phlegm. This taxes the powers greatly; and milk, beef-tea, and wine must be given in no stinted quantities. The prescription of squill, acid, and chloroform

given in the last section is a palatable and withal powerful expectorant, and is easily rendered more stimulant, when required, by increasing the dose of spirits of chloroform. Another still more powerful but disagreeable mixture is the following:—

Ammon. Carb. gr. v.
Sp. Chloroformi, ℥xxx.
Inf. Senegæ, ℥i.

It may be given every four or six hours. If the circulation be failing, the tincture of digitalis must be added to the mixture. If the heart be already the subject of structural disease, the bronchitis will usually go very hard with the patient; and digitalis must be given early and continued throughout the case, else the patient will probably die. As convalescence proceeds, the carbonate of ammonium may be continued along with the ammonio-citrate of iron and bitters.

Apomorphine is undoubtedly by far the best and most powerful expectorant with which we are acquainted. It is usually prepared by digesting morphine with excess of hydrochloric acid for some days on a water-bath. In this process the morphine loses a molecule of water and becomes converted into apomorphine. It may also be obtained by heating codeine with hydrochloric acid. If given by the mouth either in solution or in the form of a pill, it acts as a pure expectorant, and never as an emetic "I made some observations on apomorphine, and found: (1) That it acted promptly as an emetic when injected hypodermically. (2) That no emetic effect was produced when given by the stomach in small doses. (3) That its properties were not impaired by keeping; and (4) That it differed so completely in action from morphine that there was no reason why it should not be given as an emetic in cases of poisoning by opium. As a proof that the drug does not deteriorate by keeping, I may mention that I gave a patient a hypodermic injection of 4½ minims of a 1 in 50 solution of the hydrochlorate, which had been exposed to the light for three months, and had assumed a dark green colour, and in less than two minutes it acted powerfully, and completely evacuated the stomach. Six months later I used the same solution in the

same dose for another patient, and it acted equally promptly, the patient vomiting at intervals for over an hour" (Murrell, *On the Action of Apomorphine and Apocodeine*).

The dose of a 1 in 50 solution of the hydrochlorate of apomorphine is ten minims every four hours, and it may be conveniently given in a mixture with syrup of tar and syrup of Virginian prune. It is one of the best remedies for chronic bronchitis and emphysema. It is of much value in bronchorrhœa. Apocodeine has much the same action, but is less active. From three to four grains of the hydrochlorate may be administered daily in divided doses with perfect safety.

It is far from being a well-ascertained fact how expectorants act. Many agents, especially the liliaceæ, are found in the breath after being taken by the mouth; they are thus partly given off by the bronchial membrane. That they cause a certain hyperæmia of this membrane and stimulate secretion in it is more than probable, so that the secretion is freer; and then under the cover of this layer of mucous cells the bronchial membrane recovers itself. But free secretion must precede repair, and so depressant expectorants must precede the stimulating and restorative members of this group.

Belladonna, or better still, atropine, which can be given in exact dose and strength, is a very useful agent when the respiration is embarrassed; and it is well to give it along with opium in phthisis. It paralyzes the ends of the sentient vagus fibres in the lungs, and so aids the action of the opium in allaying the reflex act—cough; and does not practically interfere with the action of the opium on the hemispheres. From its effects upon the respiratory centre and its effects upon the sudoriparous glands it is a good tonic in hot weather in patients whose breathing is embarrassed, and who sweat very freely and so lose their blood-salts.

Strychnine also acts powerfully upon the respiratory, as on all motor centres. It is very useful in cases of chronic bronchitis with emphysema and embarrassed breathing. It stimulates the respiratory centres when failing, in the same way that digitalis acts upon the cardiac ganglia. Where the breathing is laboured and painful, or failing, strychnia will often restore it and make the patient comparatively comfortable. In acute bronchitis, in

the later stages, when death is impending from exhaustion of the respiratory centres—worn out with the sustained respiratory efforts which alone can maintain life—then strychnine will often save life; given more freely and in larger doses than are usual when it is merely given as a tonic. Where the patient is evidently sinking, heroic measures are not only justifiable, but are actually called for. The ordinary prescription for chronic bronchitis with emphysema, and for acute bronchitis when the first stage is over and the secretion is free, is—

Am. Carb. gr. v.
Tinct. Nuc. Vom. ♏x.
Tinct. Scillæ, ℥ss.
Inf. Serpentariæ, ℥i. ter in die.

To which ten drops of tincture of digitalis may be added when the right side of the heart is severely taxed. In embarrassed respiration due to disease, strychnine is very useful, and often soon removes the attacks of dyspnœa which come on in deep sleep. The use of belladonna and strychnine as stimulating expectorants is in its earliest infancy.

Sometimes, however, an attack of acute bronchitis, instead of passing away, persists as a chronic affection. One of the best remedies for this condition is Pure Terebene. It is a clear, colourless fluid, having an aromatic odour, and it is made by the action of sulphuric acid on oil of turpentine, and subsequent distillation and re-distillation. It must be carefully distinguished from the common proprietary Terebene used for disinfecting purposes, and largely employed to pour down drains. "One of the advantages of Pure Terebene is that it is not a bulky medicine. An ounce bottle is easily carried in the pocket, is always ready for use, and will last for days. It is best to begin with five or six drops on sugar every four hours, and gradually increase the dose to twenty minims. This, for most people, is the maximum quantity, but the drug has little or no toxic action, and one patient was so enraptured with his remedy that he insisted on taking a teaspoonful every four hours for a week. The only disadvantage I have ever noticed in it is that it gives a peculiar and characteristic odour of violets to the urine, a circumstance which patients never fail to

mention. It has been said, exceptionally, to produce a rash on the skin, but that may be taken as an indication that it is not pure, and that it is contaminated with turpentine. When used as a spray, from one to two ounces should be diffused, and inhaled every week" (Murrell's *Chronic Bronchitis and its Treatment*).

The Elixir of Terpene Hydrate made by Monro and Co., 273, Regent Street, London, is an excellent preparation. For diabetic patients it is made with saccharine or sucrol.

If there is a history of gout or rheumatism, potash, iodide of potassium, and balsamic remedies, as benzoin, ammoniacum, and guaiac, must be given. The use of astringents is of doubtful desirability. If there be anæmia and debility iron must be given, and astringent forms of it will be found preferable. In many cases change to a warm climate may be distinctly indicated; and cold air is found to keep up and aggravate the lingering mischief. A respirator is a most comfortable and effectual means of aiding the convalescence. In those who suffer from winter cough the resort to a respirator as a preventive measure will be found to often preserve the wearer from the wonted trouble. When bronchitis remains in a chronic form from sheer debility in the patient, then cod-liver oil (often simply invaluable), chalybeates, tonics, and good food are the measures which will be found most satisfactory in enabling the diseased mucous membrane to recover its normal condition. Where the right ventricle is much distended, as is the case when chronic bronchitis is accompanied by emphysema, then digitalis is indicated, and is of much service. In accumulations of phlegm emetics are often followed by great relief. Many cases are much benefited by inhalations.

Another good remedy for chronic bronchitis is tar. It may be given in two-grain doses every four hours. It is best made into pills with lycopodium. Tar-water and tar-beer are extensively used in many parts of the country. The Syrupus Picis of the United States Pharmacopœa is a useful and agreeable preparation. Birch-tar is even more efficacious than the common beech-tar.

Cheken is another good remedy. Cheken, or Chekan, or Chequen—for it is known by all three names—is an evergreen

shrub, closely resembling our common myrtle, and it grows abundantly in the central provinces of Chili. It is usually said to belong to the genus Eugenia, but by some it is referred to the closely-allied genus Myrtus. The natural order Myrtaceæ contains many medicinal plants, as, for example, the clove (*Caryophyllus aromaticus*), cajeput (*Melaleuca minor*), pimento (*Eugenia pimenta*), and the members of the Eucalyptus tribe. Cheken is usually given in the form of a 1 in 1 liquid extract, the dose of which is from one to two drachms in water three times a day. It has an agreeable aromatic taste, and is a great favourite with patients. Most chemists keep it, and it can be obtained without difficulty.

Cubebs is another good remedy. A drachm of tincture of cubebs made by adding to a cup of linseed-tea flavoured with lemons and sipped slowly in the morning after breakfast. Many chronic bronchitics smoke cubebs cigarettes.

§ 151. Inflammation of the bronchi and bronchiæ may be complicated with spasmodic action of the muscular fibre of those tubes; and then the case is very severe and distressing. When this complication occurs, lobelia or the bromides are the remedies in most favour. Lobelia is, however, a powerful depressant, and must be used cautiously.

At other times the spasm of the air-tubes comes on without any connection with inflammatory changes. Here it is known as asthma. The spasmodic nature of genuine asthma renders its treatment very different from that of the dyspnœa of heart-failure, of bronchial inflammation or thickening, or that of anæmia. It comes and goes in the individual, leaving him well in the interval; it may show itself once or twice, or persist through a lifetime; usually it disappears while the system is under the influence of any intercurrent malady. It is very difficult to approach rationally the question of what is to be done in asthma. Inhalations of nitre fumes, of nitrite of amyl, the smoking of datura stramonium, are direct applications to the affected parts. At other times depressants pushed very far are the best means of relief, and tobacco, taken until its toxic symptoms are induced, is a favourite measure. Sometimes it must be met by agents which lower nerve action, as bromide of potassium. Finally, it is well to avoid those exciting causes

which experience has shown to be provocative of an attack. In hay-asthma, for instance, flight from the pollen of the anthoxanthum odoratum is absolutely necessary. Yachting where permissible is an excellent preventive. At other times the attack is found to follow intestinal derangement, or to be preceded by a thick and high-coloured condition of the urine. The treatment of the patient during the interval is no unimportant matter; but this depends on the peculiar necessities of each case. Thus in asthma occurring at the catamenia the bromides are indicated; when each attack is preceded by a voracious appetite, moderation in diet is as effective as in epileptic attacks of like associations. Where attacks are set up by the vascular turgescence in the bronchial lining membrane caused by a cold, avoidance of cold is very desirable. There is yet another form of asthma, especially troublesome to persons suffering from emphysema (with or without chronic bronchitis), viz. flatulent asthma. A sudden development of elastic gas in the intestines prevents the descent of the diaphragm, and then the resultant dyspnœa is very trying. The pressure of the elastic gas on the right ventricle impedes the action of the heart. This is most markedly seen when the gas is in the colon and the right side of the heart dilated.

§ 152. Affections of the lung structure—the second division—furnish—whether in the acute or chronic forms it matters not—perhaps the most complete debatable grounds of medicine. In the acute form our immediate ancestors bled to death's door, while Rasori gave huge doses of tartar emetic; more recently, every new remedy almost is tried in turn for pneumonia, and found to be followed by a large proportion of recoveries; but in how many cases the recovery is rather in spite of, than in consequence of, the treatment employed, may be open to question. It is now, however, generally recognized that pneumonia presents in itself no especial indications for treatment; and consequently it must be treated according to the indications of each case, and of the system in which it occurs. If the patient is stout and strong, and the pulse full and incompressible, a depressant line of treatment is indicated; and as the pulse becomes softer relief will be experienced. On the other hand, where there is obvious debility, and the pulse is small, com-

pressible, and fast, stimulants, tonics, and liberal supplies of easily assimilable food are the measures to be adopted. It is questionable, however, how far by any measures we can hasten the natural processes of pneumonia, or exercise any influence over the progress of the ailment. But it is certain that we can aid the system to tide over the attack; and also that we can moderate its severity, by attending to the different indications furnished to us in each case. We can give aid in each stage of the malady; in the first stage we can moderate the inflammatory rise, and control to some extent the pyrexia. In the second stage we can attend to the general indications, and can, at any rate, treat symptoms if we can do little for the malady itself. While in the third stage stimulants and tonics will often enable the patient to pass through a period of peril, and to round in safety the critical point. This may seem but little; but in reality it is much. By moderating the pyrexia, &c., of the early stage we lessen the amount of exhaustion which may come to constitute the prominent danger of the later stage. In that later stage we may give such aid as shall enable the patient to survive till the disease has run its course into convalescence. It is equally certain that by injudicious measures the natural efforts may be thwarted or opposed; and so the patient's life may be imperilled, as a consequence of our well-meant but ill-designed measures for his benefit. If both lungs are affected so that the pulmonic circulation is much obstructed, it is good treatment to bleed freely; so as to diminish the bulk of blood, and secure a nicer adjustment of balance betwixt the blood and the respiratory powers, than existed before. Such practice is neither inconsistent nor incompatible with the administration of stimulants even at the time of bleeding; the bulk of blood must be reduced at all risks, and the hazard involved in doing so must be met and obviated by all means in our power. It is the standard practice now in pneumonia to resort to that modified form of bleeding involved in the application of large hot poultices to the trunk. The jacket-poultice is the best thing. It reduces the blood-pressure in the veins and right heart; its heat stimulates the heart; while the blood is conserved and is useful for future needs, when the powers of the system may be strained to the utmost limits of endurance.

The utility of blisters in pneumonia is doubtful. The advocates of such plan have failed to furnish convincing evidence of the beneficial effects produced thereby. The use of venesection, either general or local, as by cupping or leeches, is merely to reduce the congestion of the right heart and the veins; and this can be done, without removing the blood from the body, by means of the jacket-poultice. In sthenic pneumonia venesection is followed by good results in severe cases; but it is a measure obviously unsuited to the large majority of the cases of pneumonia that come under our notice.

Especially is this the case in those low forms of pneumonia which are so prone to show themselves in conditions of great debility, and in the course of continued fevers. Why and wherefore the lungs should under such circumstances become subject to inflammatory change it is not for us to inquire here. The fact remains that it is so; and the treatment of pneumonia here is the treatment of the condition on which it depends. Free stimulation is often imperatively called for; and the patient must be tided over the danger of the hour even if the treatment necessary for this end be not entirely free from some risks of its own.

Pneumonia is a common cause of death in chronic maladies which are themselves but slowly fatal; and all our efforts in these cases are commonly unsuccessful. At other times pneumonia is associated with the development of a lowly form of tissue-growth; and then it forms a tubercular pneumonia, or acute tuberculosis, which is fatal in three weeks or less.

If this work were chiefly pathological, pneumonia would call for a very long and elaborate description; but as its aim is mainly therapeutical, a brief consideration is all that can be given to it. There is no treatment for pneumonia in itself. Its treatment in each case is a good touchstone of the general information and skill of the practitioner; and of his power to observe and to apply general principles. No description of pneumonia, or lengthy survey of our remedial measures, will, or can, take away the necessity for resort to individual thought.

§ 153. If these remarks hold good of acute pneumonia, they apply still more aptly to those chronic conditions of limited inflammation of the lungs, which in their course and con-

clusions vary so much. In acute ailments careful examination will reveal in many cases a patch of pneumonia. This may be of no moment whatever; or it may be of the most serious import: its existence must be noted, and its progress watched. It may quickly disappear, as is doubtless the case in most instances; but it may persist, either as a limited area of chronically thickened lung from growth of connective tissue, sufficiently elaborated to maintain its vitality unimpaired; or it may consist of a too lowly form to live, and then fatty degeneration of the neoplasm may be accompanied by ulceration around its periphery; in which case the patient usually has to swim for his life. The hectic fever which may co-exist with this ulcerative process may wear out the patient, assisted by the terrible and persistent cough excited by the presence of this foreign body in the lung, this "thorn of Van Helmont"; and aided by the sleeplessness, the exhaustion, and expectoration with night-sweats, which mark this condition. Not only so; but the inflammatory margin of lung along the ulcerating process may itself no longer furnish a healthy pyogenic membrane; the connective tissue here may be of so lowly a form that it must in its turn soften and necrose, entailing another period of hectic fever with its terrible associations.

It is obvious then that in chronic pneumonia it is of the utmost importance to prevent if possible the altered lung-tissue from becoming tubercular, to ward off as far as may be any tendency to degradation in the cell-elements of the neoplasm. Such must be our first aim; and in all cases of disturbance of health, especially in young persons, the lungs should be carefully examined again and again for these localized patches of parenchymatous inflammation. When they are found they must be noted and their progress carefully observed; and at the same time the general condition, and especially the temperature and pulse, must be watched. The general nutrition is the point to be attended to, for if it be defective the repair of the inflamed area will be but imperfect. Food in liberal supplies and of an easily assimilable character must be given at frequent intervals; and the appetite must be whipped up by bitters; if there is irritability of the stomach it is well to give—

Bismuthi Carb. gr. x.
Mist. Acaciæ, ℥ i.
Inf. Calumbæ, ad ℥i.

three times a day before food. If there is much acidity, ten grains of bicarbonate of sodium or of potassium may be added with advantage. Some practitioners prefer the mixture of calumba with compound tragacanth powder in these cases. There can be no doubt that in many cases the first matter is to keep the stomach in good condition, so that the assimilation of food is sufficient and effective: by this means the necessary nutrition is secured for the growth of healthy connective tissue. The other measures, as the arrest of the hydrosis, moderating the cough, correcting the bowels, and securing sleep, are secondary to this;—though important enough themselves. For securing sleep a mixture of trional and sulphonal will be found useful. The regulation of the bowels, the relief of constipation, and the arrest of diarrhœa, are of much moment. Where diarrhœa co-exists with night-sweats, it is well to give a pill of sulphate of copper (gr. $\frac{1}{2}$) with opium (gr. ii.) and extract of cinchona at bed-time. If the patient is but temporarily reduced, and the patch of chronic pneumonia is the result of passing adynamy in a healthy person of good family history, the prognosis is good; though there may be no arresting the process until the mass be expectorated and a cavity formed. In some cases the walls of the cavity fall in; and a puckered cicatrix is all that remains of what was once a dangerous mass of degraded tissue, whose expulsion had almost exhausted the powers of the patient.

At other times there may be found a condition of numerous small masses of tubercle surrounded by healthy connective tissue, so that the encapsuled mass softens, its organic matter is absorbed, and ultimately, small mortar-like masses—the inorganic constituents of tubercular growths—are either expectorated, or are found in the midst of hardened lung-tissue after death. These are the cases over which young practitioners are so apt to trip. They discover that there is an area of dulness, where the breath-sounds are altered; but they fail to distinguish whether the mass is that of new growth, or the remains of some

long by-past mischief. Yet it is most important prognostically and therapeutically that such diagnosis be made; and correctly made too. By a sufficient amount of care and knowledge this may usually be determined. If, however, the patient's health be thoroughly broken; or the family history tells unquestionably that there has been a strong tendency to the formation of tubercle, especially on the father's side, then these localized patches of pneumonia must excite the most apprehensive attention; and no stone must be left unturned to avoid the degenerative changes which will be accompanied by so much danger to life.

§ 154. When the diagnosis has been made, that there is present in the lungs a certain amount of pathological connective tissue of a degraded character, the treatment divides itself into two lines. The first is directed to the cure of the patient; the second is that of relief in incurable disease and the procuring of euthanasia. As long as hope remains, the first is to be sedulously pursued; and it is a complicated matter. For there are two points to be attended to which are somewhat antagonistic. These are the maintenance of the general health, and the securing of an atmosphere which is agreeable to the diseased lungs. The pursuit of the latter has studded the shores of the Mediterranean with villas, where the Anglo-Saxon and the Sclav stay during the winter season, and so avoid the severe winters of their own lands; the necessity for the former has established health resorts in high-lying table-lands, and filled Swiss chateaux and Californian sierras in summer with phthisical patients. It is not caprice or fashion merely which has determined two such apparently antagonistic lines of practice. The choice depends upon the case. In one the hot summer so enervates the patient that the benefits of warm air are more than counterbalanced by the general depression and loss of appetite; and consequently summer must be spent in a bracing situation at a high altitude. In the other the irritation of cold air overrides the good effects of the low temperature upon the general condition; here a warm winter resort is indicated. In some phthisical patients quiet exercise in the open air is all that can be undergone; while others are the better for pretty severe exercise. In these latter the good effects of exercise outweigh

the evil effects upon the lungs of their increased functional activity: while in the former, rest, as far as it is practicable, is sought for the impaired respiratory organs. Some persons again must lead an outdoor life if they wish to survive: and a return to an indoor life in town is at once followed by a return of the ominous symptoms.

In others, again, there seems to be a certain intolerance of ordinary foods, which are not assimilated, and in these persons certain preparations of milk are often of great service. Hence we find the koumiss cure, the whey cure, &c., in many cases, undoubtedly useful. In North America it is found that a youth who is inclined to be phthisical is often much benefited and even cured, by "lumbering," in winter. This means long hours in the open air, with the steady use of the axe, and unlimited supplies of fat pork; no longer repugnant to the whetted appetite. Under these circumstances many consumptives recover. Fresh air, a keen appetite, liberal supplies of food largely hydro-carbonaceous, and sleep, the result of exercise, are the measures by which the first line of practical treatment is to be secured.

When, however, it becomes apparent that the malady is not to be conquered, the second line of treatment is to be followed. An agreeable temperature, gentle exercise in the sunlight in a carriage, or a brief seat in the sun during mid-day in winter, and at morning and evening in summer; a cheerful bedroom and pleasant surroundings, to be accompanied by the administration of narcotics, analgesics, and anhydrotics, for night-sweats, are what must be secured as far as possible.

§ 155. When there are good grounds for the opinion that the connective tissue in the lungs is of fairly good character—of a sufficiently high vitality to maintain its existence, the prognosis as to life is much better than when it tends to degenerate into tubercle. In such cases there is generally a history of exposure to the inhalation of dust, as in masons, especially in the more highly-paid fine hewers, in potters, in colliers, and in steel grinders; the finer the particles ground the worse for the grinder. In a large majority of these cases, where the disease is a form of chronic broncho-pneumonia, the result of mechanical irritation by the respired particles, a brief

respite from their ordinary employment will give much relief. In all, however, the adoption of some other form of industry is very desirable. Emigration, the army, or police force, game-preserving, or agricultural labour are the lines of life to be aimed at; and such changes of occupation often give the most gratifying results. Persistence in their pursuits will have the effect of anticipating or precipitating the final change. Good food, cod-liver oil, extract of malt, outdoor exercise, are as necessary for these cases as they are for the tubercular.

There is one point which may be raised about all chronic diseases of the respiratory organs, and that is the desirability, or otherwise, of the use of wind instruments. Where there is an imperfect chest development the use of such instruments has often produced a very satisfactory change; but, on the other hand, such functional activity of the lungs has too frequently but baneful consequences. When acute mischief is going on rest and quiet rather are indicated; when a growing youth has a badly-developed chest a cornopean may not be out of place. "Voice production" under the direction of an expert teacher is, however, much safer. The ordinary teacher of singing is absolutely useless for this purpose, and it is essential to consult some one who has some acquaintance with physiology, or more harm than good will be done.

§ 156. The third division—the serous coverings of the lungs and their affections—now demands our attention. The serous sacs are dilatations of the lymphatics—they are lymph-sacs, whose smooth surfaces glide easily upon each other, lubricated by their fluid contents. They usually contain but a slight amount of fluid, just enough to keep the surfaces moist; but under certain conditions the balance betwixt the outpour and the absorption is disturbed by disease, and then there are accumulations of fluids, and diminution of the thoracic space. Such effusion, as the accumulation of fluid is termed, may be either active or passive. The first is the result of inflammation, the second usually of venous congestion. In the simplest form of pleurisy, viz. that occasioned by the friction of a broken rib, there is first acute hyperæmia with sharp pain, aggravated by motion and relieved by rest; and then effusion of fluid, by which the pleura and its source of irritation, the sharp point of

bone, are separated. By this last means physiological rest is secured, the cause of the inflammation in the pleura is removed, while the effusion limits the movements of that side of the thorax; and the rest so secured admits of a broken rib becoming united. Surely such action is rather a reparative process than a disease *per se*. It is obvious, however, that if we place that fractured rib at rest by a firm bandage, which limits thoracic movement, and leaves respiration almost abdominal; and at the same time relieve the irritated pleura by full doses of opium, so as to bring out both its analgesic action and its effects upon secretion; we may secure a better line of treatment than that which is instituted by the unaided efforts of the system.

At other times, from some cause or other, the pleural surfaces become inflamed. Secretion is arrested, and instead of gliding smoothly, these dry serous surfaces rub upon each other at every respiratory movement; there is acute pain, and arrested thoracic motion gives partial relief, while sooner or later effusion and separation of the inflamed surfaces follow. At other times there is pleurisy without effusion. Especially is this the case in the apices of the lungs when the subject of tubercle. A little mass just underneath the visceral pleura irritates the costal pleura on every respiratory movement; a localized inflammation binds the two pleuræ together, and then relief is obtained. Such are the sharp pains about the clavicles so often complained of by the phthisical, often long before there is any serious perceptible disease.

The line of treatment to be pursued in pleurisy is to check the hyperæmia, which may be done by the use of depressants; to ease the pain by the use of opium—antimonial wine, fifteen drops, and twenty drops of laudanum every four or six hours—and to affect the costal pleura, at least, by the use of external applications. These may be of two kinds. One is that of the application of some agent which will divert the flow of the blood in the intercostal arteries into the cutaneous vessels, and so tend to starve the inflamed pleura beneath; and this end will be secured as well by hot poultices as by blisters. If such combination be boldly followed out venesection will rarely be needed, and local depletion will be avoided. The other external application is that of analgesics. By the same law that

regulates the blood-supply of the deep-seated parts and the surfaces over them—the law of Schrœder van der Kolk—is the nerve-supply regulated; and by applying analgesic agents to the cutaneous peripheral distribution the pain is diminished: either a reflex effect being produced upon the nervous distribution below the surface; or a condition of impaired conductivity in the nerve fibrils being effected. In painful dry pleurisy an opium plaster, aconite liniment, or subcutaneous injection of morphia will give relief. A third measure, that of strapping the chest, so as to procure physiological rest, is worth trying.

When acute pleurisy is the consequence of some blood-poison, the special measures must be kept subordinate to the treatment of the causal condition.

§ 157. When there is fluid in the pleural cavities there are several plans of treating the case. Of old it was the rule to use blisters round the diseased side, repeating them as often as was necessary; and to give absorbents, together with diuretics; and these diuretics were those which affect the circulation, as digitalis and squill. By such means good results were often attained. At other times the lung becomes bound down by adhesions, and instead of expanding at each respiration as the effused fluid is absorbed, the thorax falls in, until great deformity, with accompanying loss of respiratory power, results. If blisters succeed in producing rapid absorption, good and well; but if they make little or no impression, then the more direct means of getting rid of the fluid, viz. tapping the chest, must be resorted to. This is now easily and pleasantly performed by the aspirator. Commonly the removal of some of the fluid is followed by absorption of the remainder. In other cases the operation has to be repeated, maybe, several times. If the pleural contents become purulent, then a drainage tube may have to be inserted, and the case treated as an abscess.

When, however, the accumulation of fluid is of passive origin, then these active measures are not indicated. Passive effusions are usually due to venous congestion in heart failure, to advanced renal disease, or conditions of great debility, and to scarlatina. In such cases the treatment of the pleuritic effusion is involved and embraced in that of the general condition.

In diseases of the mediastinal spaces, as tumours, hydatids, &c., the treatment of the case must be conducted on general principles.

§ 158. In affections of the respiratory organs there are two chief phenomena produced, viz. cough and dyspnœa. So important are these two symptoms, and yet often so different in their causations, and consequently their importance and their indications for treatment, that they must be considered at some length. By such special consideration the lines of treatment to be followed will be more clearly marked out than by the arrangements usually adopted—at least it is hoped so.

A cough is usually an attempt to remove some irritant matter from the thorax by means of the respiratory tract. When a foreign body gets into the larynx, or air-tubes, violent and convulsive cough ensues, until either the intruder is expelled; or, in rare cases, till the parts have become accustomed to its presence, and the efforts to expel it subside, and are no longer evoked. The cough is a reflex act set up by some exciting cause; the irritation so excited putting in force the complex muscular actions called a cough. In doing so the chest is well filled with air, and then a strong expiratory effort follows which may carry off the irritant cause; if it is unsuccessful, another cough follows. Sometimes there is induced a fit of coughing. Here there is imperfect inspiration and futile efforts at expulsion, often until exhaustion is produced. Such is especially the case when the exciting cause is of such a nature that it does not admit of expulsion. Under these circumstances cough is often teasing, persistent, and exhausting. As regards affections of the organs within the thorax, cough is usually associated with the air-tubes, the lung-tissue, or the pulmonic circulation. The simplest form of cough is that associated with the air-tubes when there is something irritant present whose expulsion gives relief. This is well seen in the common expectoration on getting out of bed in a morning. During the hours of sleep mucus has accumulated gradually upon spots which have become accustomed to the presence of these growing masses. In the movements of dressing, especially in stooping, these masses of mucus slide on to other parts of the air-tubes. In this new locality the irritation induced is sufficient to cause a

series of expulsive efforts until the masses are got rid of. After a cold this is very well shown; and repeated series of coughs are required to dislodge one mass of phlegm after another. If the mucus be dry and tenacious, great and repeated efforts are requisite for the expulsion of any accumulations: here we give expectorants which increase secretion, or loosen the phlegm, as it is termed. Where there is a considerable secretion, brief sleep is followed by expulsive efforts, which clear the air-tubes; and then sleep follows, again to be disturbed. This is one of the sources of danger in bronchitis; the patient may become worn out by the disturbed rest and the exhaustion so induced. At other times there is much cough with but little or no expectoration, and yet it is one phase merely of cold. Instead of increased secretion there is rather an irritable or "raw" condition of the lining membrane of the air-tubes induced. Here cough is useless, though often very distressing. It must be met by sedative neurotics, as Tinct. Camph. Co. (℥xx.) and Pot. Brom. (gr. x.) in Mistura Ammoniaci (℥i.), or Inf. Serpentariæ, three or four times a day; or a morphia pill with benzoin may be given. This is one of the few forms of cough where opium is not contra-indicated. Where there is much secretion, opium tends to arrest the secretion. In these cases counter-irritation by the application of liniments—as croton-oil liniment to the anterior surface of the chest—is often most satisfactory in its results. When the irritation is in the larynx it is often possible to reach it and apply remedies directly to the irritated surface; thus nitrate of silver may be applied in the form of spray, or morphia with powdered starch may be blown in upon the diseased laryngeal surface.

At other times cough is due to an alteration in the lung-structure, and especially to the growth of a mass of tubercle. Here there is an ever-present source of irritation to some of the terminal ends of the pulmonary nerve-fibrils, which excites the reflex action—cough. A persistent dry cough has ever been held as one of the heralds of consumption. Even when too small to be detected by physical signs, a tubercular mass may declare itself by the phenomena which it induces. The hacking cough of such a state of affairs is well known. Here morphine gives much relief; but to be efficient it must be given con-

stantly, and so becomes itself harmful, as it may destroy the appetite, if not combined with vegetable bitters and a laxative. When the mass has softened, then cough is useful in expectorating the foreign material and relieving the lungs of its presence. Cancer nodules will also give rise to futile cough in consequence of their presence acting as foreign bodies in the lung structure.

Cough is not rarely induced by pulmonary congestion, by an hyperæmic condition of the pulmonic circulation. Here the fulness of the blood-vessels is the causal irritation which sets up a dry, hard cough. It is readily recognizable as the cough of heart disease. Most persons can induce it by running upstairs. The characteristics of this form of cough are not lost by its being accompanied by free secretion in advanced cases. In this form of cough, morphia must never be administered, as it too often is. This cough much resembles in character the cough of dry bronchial irritation, for which paregoric has just been prescribed. But as it differs from this cough in causation, so its treatment varies. Heart cough should be met by relief of the vascular condition, and not by sedatives. Again and again it has fallen to our lot to see great mischief done by the administration of opium and morphia in the cough of pulmonic vascular fulness. The cough must be left alone if possible; and certainly it must not be allayed by repeated doses of morphia.

The less common intra-thoracic causes of cough are aneurysm and mediastinal tumours. In such cases there is no prospect of the expiratory efforts succeeding in expelling the irritant cause, and here again it is possible to give opium, bromide of potassium, chloral, or camphor with advantage.

At other times cough is excited by irritation, which is not intra-thoracic, as in the well-known stomach cough, ear cough, liver cough, &c. The commonest of all these reflex movements due to comparatively distant irritation is that of pharyngeal follicular ulceration. A large number of cases which are put down as phthisical, are really cases of pharyngeal ulceration. By the application of local measures, and especially nitrate of silver, the ulceration can be induced to heal and the symptoms then disappear. Doubtless when unrelieved these cases have

often led to a gradual death by wasting. In all cases of pharyngeal irritation the use of local sedatives is indicated.

Lozenges of various kinds—demulcent, opiate, or astringent—are largely used. Then there are household remedies such as linseed-tea, whilst jujubes, acid-drops, &c., are useful. By increasing the flow of saliva they cover the irritable part and lessen the irritation, and with it the consequent cough. There is also the further matter of adding sedatives or astringents to the soluble mass, which increase the efficacy of the flow of moisture over the affected part. If the irritation is excessive, and the paroxysms of cough are distressing, something of this kind is indicated: Acet. Morph. gr. i., Syr. Rosæ, ℥i. Mucilag. ℥ss.; ℥ss. at repeated intervals. This should be slowly swallowed, so as to be as long as possible in contact with the sensitive membrane. In the same way the cough of gastric irritation is to be met by putting the stomach in order; and especially is this the case where the gastric irritation is associated with dram-drinking. Unloading the liver thoroughly will also relieve the cough which takes its rise in hepatic congestion. Peripheral irritation will often give rise to cough, as in chest exposure for instance. Here any cold playing upon the chest will excite cough, while a warm poultice will relieve it; and a chest-protector will give great and continuous relief.

At other times cough is a true neurosal affection, and must be met by the ordinary measures of chalybeates, tonics, &c., and occasionally by the union of these measures with bromide of potassium. There is often a brazen or ringing character about a neurosal cough. Sometimes the neurosal cough has certain especial surroundings, as in the so-called hysterical cough. This is common in girls and young women. It is very frequently associated with the changes of puberty; and again and again does such cough excite unfounded apprehension, being mistaken for the cough of tuberculosis. It is a cough which is almost incessant: it is often a dry "hemming" cough. Its origin is either central in the deeper-seated portions of the basal cerebro-spinal ganglia; or it is due to some peripheral irritation, as uterine or ovarian excitement. It is often found with hysterical paralysis or spinal irritation. In all cases of persistent cough with little or no expectoration it is ever

desirable to examine the uvula, to make sure that the cough is not due to the tickling produced by this organ when elongated. If necessary, the uvula should be amputated.

A distinctly characteristic cough is that of pertussis, or whooping-cough. It is distinguished by the long inspiration, recognized as the "whoop," which terminates the repeated violent expiratory efforts that precede it. In these efforts the stomach is commonly emptied of its contents, and the great danger looming is death from inanition. Here the best thing to be done is to feed the little sufferer immediately after the attack, so that the food may be assimilated ere the next attack of coughing comes on and empties the stomach. The treatment of whooping-cough is very unsatisfactory. Sometimes the reflex action can be stayed by bromide of potassium in a magical manner; more frequently, however, it fails. At other times quinine seems useful; or steel or zinc may be tried. Phytolacca and drosera are excellent remedies in spasmodic cough.

Such are the leading varieties of cough which come before us. It is clear enough that cough has to be met by different measures, according to its causation and the conditions with which it is associated. The elixir which is all powerful in one form is useless in another.

§ 159. Dyspnœa is the other phenomenon so commonly met with in diseases of the respiratory organs. It, however, is often due to enlargement of the abdominal viscera, which, by pressing the diaphragm upwards, diminishes the thoracic space. It does not matter whether the disease which diminishes the breathing space within the chest be thoracic or extra-thoracic, the result is the same. The intra-thoracic causes of diminished space are pneumonia, pleuritic effusion, congestion, mediastinal growths, aneurysms, &c. In such cases the only measures which will give relief are those which will remove the cause of the diminished space. At other times there is obstruction to the passage of air in the larynx, the trachea, or in the bronchial tubes. These are mainly constant, as when an aneurysm presses on the trachea—though this may also give rise to inter-current severe paroxysms—when there is laryngeal cicatrization following ulceration, or when there is thickening of the bronchial lining

membrane. It may be continuous, but temporary, in bronchitis, especially if capillary. In such cases there is little to be done except the general measures of stimulants, with inhalations of steam, with which may often be profitably combined some balsam or pine resin, as terebene. At other times the dyspnœa is paroxysmal, and due to spasm of the bronchial tubes. Here the affection is neurosal. Dyspnœa is often cardiac in its origin, and associated with congestion of the pulmonic circulation. Consequently it is common when there is mitral disease and the right heart is failing. These attacks of cardiac asthma are often severe and always distressing; they must be met by the measures given in detail in the last chapter. In that form of dyspnœa where the patient can only breathe when propped up, known as orthopnœa, there is usually disease of the right side of the heart, with or without left-side disease. There have been many explanations offered as to causation of this condition. The only one about which there is absolute certainty is an anatomical one, viz. that when the abdominal viscera fall away by their mere weight from the diaphragm, they give the heart more room to play in, as well as increasing the thoracic space for the play of the lungs; when in the recumbent posture the weight of the abdominal viscera presses against the diaphragm as well as against their other parietes, and pushes it up into the thorax. In such dyspnœa change of posture as well as the administration of digitalis and stimulants are indicated.

As cough may have an origin in which the respiratory organs have no share, so dyspnœa may arise from conditions not associated with lung disease. Thus poverty of the blood by its reduced number of red corpuscles and corresponding reduction of hæmoglobin, diminishing the chemical interchanges, may give rise to dyspnœa. This is easily increased by exertion. Chlorotic girls furnish the best and commonest forms of this "air-hunger," as the Germans call it. Here the relief of the anæmia is the most, and indeed only, efficient means of treating this phenomenon.

§ 160. We must not altogether overlook hæmoptysis ere concluding this chapter. It is often a most alarming symptom of a most grave condition. At other times, even when not a vicarious catamenial flow, it is not to be regarded as a serious matter.

Ordinarily it is to be met by cold fluids, perfect quietude and silence, and astringents—ergot, sulphuric acid, &c., with opium. When profuse, dry cupping over the back and the inhalation of turpentine from a pocket-handkerchief or a piece of lint will usually afford prompt relief. When dependent on cardiac disease, on disease of the mitral valve leading to pulmonic congestion, bleeding from the arm is useful. Under one set of circumstances hæmoptysis occurs as a sort of leakage. In these persons there is a tendency to make blood rapidly, and then the weakest spot in the vascular system gives way. If this *locus minimæ resistentiæ* be the lung, the recurrent hæmoptysis will go on for years; but if some other point become least resistent, as the uterus, for instance, then the hæmoptysis vanishes—to return, however, in the instance cited—on the occurrence of pregnancy. In such cases a most restricted diet will produce but little blood, and slow and retarded blood-formation will lead to a gradual filling of the vascular system, by which hæmoptysis may be avoided.

It is not the mere hæmoptysis—for loss of blood is loss of blood, no matter whence it comes—it is the circumstances under which it occurs which lend the gravity to this form of hæmorrhage. Hæmoptysis not rarely gives great relief to an acutely congested lung, and in so far is useful; though it may thus be a good form of local bleeding, it is always well to do away as far as possible with the necessity for such an alarming auxiliary. The cessation of the hæmoptysis can ever be hailed as a sign of better things, and of the success of the treatment adopted.

It may be well to conclude this chapter with a warning. Opium kills by paralyzing first the respiration and then the heart. Whenever there is serious mischief in the thorax, opium must be given in only small doses—say three minims of the liquor morphine—or if larger doses are employed they should always be combined with atropine. Whenever the respiration is seriously embarrassed opium is a most dangerous remedy to prescribe; the already taxed respiratory centres may be palsied by a moderate dose, and death result.

CHAPTER XVI

THE DIGESTIVE SYSTEM

§ 161. The question of the assimilation of food, and the means of assisting in the production of good digestion. has been already discussed. Here it is designed to review the various affections of the digestive tract and to point out the means, rational and empirical, by which they may best be treated. A large section of these ailments is comprised under the head of indigestion.

Dyspepsia, or indigestion, is a term which covers a number of separate and distinct pathological conditions. As the term implies, there is present difficult, imperfect, or painful digestion. When there is pain present there is lack of gastric juice; where there is a sense of distension there is imperfect muscular movement in the stomach. Both may be present. The treatment is regulated accordingly. After food is taken there is a sense of discomfort, either immediate, or not for an hour or so. This is accompanied by general malnutrition, spareness, and general ill-health. In some cases there is much toleration of some forms of food, with equally marked intolerance of other forms. Consequently the form of food, its manner of preparation, the quantities in which it is taken, are all important matters to be attended to. Whatever the exact pathological form of the malady and the indications for treatment as regards medicines, the diet must be carefully regulated. What rules shall guide the practitioner in the matter of diet will be given after a brief consideration of the leading forms of gastric maladies, and of their remedial measures. In the first place, however, the importance of carefully chewing all solid forms of food cannot

be sufficiently insisted on. A potent factor in the production of dyspepsia is loss of teeth and especially of the molars. If a person has defective teeth he cannot masticate properly. The food is swallowed in the condition in which it is taken into the mouth instead of being broken up into its constituent parts and mixed with saliva. When food is taken into the stomach unmasticated and unmixed with saliva the gastric juice cannot act on it, or acts on it very imperfectly. The result is that the food is only partly digested, and soon gives rise to a sense of pain and discomfort in the chest. The food being delayed overlong in the stomach, undergoes acid fermentation, and the patient suffers from acidity and distressing flatulence. After a time the stomach becomes irritable, and attacks of nausea and vomiting are added to the other miseries. The particles of undigested food which make their way into the intestines are a source of irritation, and the result is diarrhœa alternating with obstinate constipation. The patient soon becomes anæmic, and loses muscular power and strength. His brain is not properly nourished, and his capacity for thought and work is considerably curtailed. His power of resistance to depressing influences is minimized, he feels the cold, and is very liable to contract a chill. This in his debilitated condition may run on into bronchitis, and ultimately end in consumption.

Caries, or decay of the teeth, as Mr. Henry Sewill has pointed out, consists essentially of a process of gradual softening and disintegration of the tissues, due mainly to the action of acid. The onset of the disease is favoured and its progress hastened primarily by certain structural defects in the enamel and dentine; and secondarily by some diseases of the oral mucous membrane and some derangements of the general health. The foundation of caries is often laid at an early age. One of the commonest causes is imperfect development of the enamel. Not unfrequently, owing to some inflammation while the tooth is being developed, the enamel instead of being evenly distributed over the dentine presents a deeply pitted or furrowed surface. These teeth, which are extremely unsightly, are known as honey-combed teeth. In other cases, as a result of deficient nutrition, deep fissures are found in the enamel. These favour a retention of food particles and rapidly lead to decay. Often

enough, the teeth are irregular or overcrowded, so that particles of food are retained between them and are not easily removed in the ordinary process of cleaning. Not unfrequently the gums are spongy and relaxed so that they recede from the teeth and leave the gums more or less exposed. It is possible that a predisposition to decayed teeth may be inherited, and it is a well-established fact that irregularity of the teeth is hereditary. Many people think that excessive intellectual work favours the decay of the teeth, and it has been stated that men reading for the higher examinations at the universities frequently suffer from toothache.

Commencing invariably at the exterior, the caries advance towards the interior of the tooth, forming a cavity, which increases in size until the crown and even the greater part of the root also are destroyed. The acid, the active agent in caries, may be derived from several sources. It may be secreted by the mucous membrane of the mouth or of the stomach. In health the acid is at once neutralized by the alkaline saliva with which it mingles; but when the membrane is congested or inflamed, the mucus increases in quantity and becomes more strongly acid in character, and is sufficiently powerful to slowly dissolve enamel and dentine.

Caries may commence on a sound unbroken surface of the tooth, especially on the lateral aspects, close to which acid is commonly generated by decomposition of particles of food lodged between the teeth, and by irritation of the mucous membrane. It frequently has a starting-point at some part of the enamel and dentine, the seat of structural defect.

The local and constitutional diseases which favour the onset and progress of caries are those which are accompanied by or which tend to aggravate inflammation of the oral mucous membrane, and those which give rise to the formation or deposit of acid within the mouth. Among the former may be enumerated stomatitis; among the latter, gout, scrofula, syphilis, and chronic alcoholism. These constitutional affections exert their effect upon the teeth in great part by reason of the chronic inflammation of the gums, and the dyspepsia with which they are all so commonly accompanied. During febrile diseases, in which the secretion of saliva is scanty and the teeth remain

coated with sordes, accumulations of epithelial scales, viscid mucus, and other foul secretions, caries, as might be expected, is often originated, and, when previously present, is always aggravated.

Much can be done to prevent the attacks of caries and to delay its progress. Too much stress cannot be laid upon the importance of the treatment of constitutional conditions predisposing to decay of the teeth. If it be omitted, the most active local measures may prove in some cases ineffectual. The prophylaxis of caries in part consists in combating diseased conditions of the mucous membrane of the mouth which are attended with vitiation of the secretions, but here it is necessary to discuss only those means which are available locally in preventing the formation of acid, in neutralizing it, and preventing its hurtful effects upon the teeth. Foremost among these means must be placed the maintenance of the mouth in perfect cleanliness. The teeth should be carefully brushed at least twice daily, and the patient should be taught not only to cleanse the more exposed surfaces, but to apply the brush to every part which it can reach. A rotary action of the brush is more effective than a to-and-fro motion, which merely polishes the surfaces which the movements of the lips, cheek and tongue tolerably clean. The upper teeth should be brushed from the gum downwards, and the lower from the gum upwards. The brush must not be too hard, but at the same time it must be remembered that a very soft brush will not serve its purpose. The tooth-brush should be a bristle one, those made of indiarubber being of very little use. A tooth-brush soon becomes unfit for use if placed in the ordinary tooth-brush tray. It should be wiped on the towel after being used, and then placed in the rack freely exposed to the air and light. Many people fail to clean their teeth properly from the fact that their looking-glass is placed between the windows, and in a bad position with regard to light. The spaces between the teeth should be frequently freed from the particles of food which lodge there. For this purpose a few threads of floss-silk, or a fold of any similar soft material, or a thin flexible quill toothpick, slipped into the spaces and rubbed briskly to and fro, answers well. Tooth-powders and lotions are of

considerable value. Mr. Sewill recommended the following formula:—

℞. Pulv. Iridis Flor. ℥ ii.
„ Sapon. Castill. ℥ ss.
„ Cretæ Precip. ℥ i.
„ Boracis, ℥ ss.
Otto Rosæ, ♏ ii.
Ol. Lavand. ♏ xii.

A less expensive preparation recommended by Mr. Charles Glassington in his *Dental Materia Medica* consists of:—

Precipitated Chalk, 3 ounces.
Carbonate of Magnesium, 4 drachms.
Powdered Orris Root, 3 drachms.
Carbolic Acid, 30 drops.

Mouth-washes may be composed with advantage of tincture of myrrh or of rhatany. The spirit which these tinctures contain, besides rendering them more astringent, is antiseptic, and it is a good plan to use them to moisten the floss-silk or other material which is employed in cleansing the spaces between the teeth. With the same design eau-de-cologne, lavender water, and similar perfumes are pleasant applications. With these lotions there may be combined carbonate of soda or other soluble alkalies when the acidity of the secretions is great, or when the patient is obliged to take acid medicines. "Listerine" and "Euthymol" diluted with water are very useful as mouth-washes, and it is by no means a bad plan to paint the gums from time to time either with glycerine of tannin or with equal parts of tincture of aconite and tincture of iodine. Mr. Glassington recommends the following formula in the treatment of spongy gums:—

Borax, 4 drachms.
Tincture of Myrrh, 4 drachms.
Rose Water to 10 ounces.

The only suggestion that might be made with respect to this preparation is, that equal parts of Elder Flower Water and Rose Water might be used instead of the simple Rose Water.

A useful procedure for the prevention of caries, in cases where great crowding of the teeth exists, is the extraction of two or more permanent teeth from each jaw during the period of the second dentition. Not only does the room afforded by the consequent equal spreading apart of the teeth render the origination of caries less possible, but it enables the cleansing of the interstices to be easily performed. In the case of middle-aged and elderly people who have lost their grinders, a well-fitting denture, which is light and does not cover too much of the palate, is essential for the maintenance of health.

When food is obviously unsuited to the stomach, or from some suddenly acting cause the digestion is arrested, as by some shock, then one of two things happens—sometimes both. The contents of the stomach are either immediately ejected by vomiting; or are passed into the intestines, and then got rid of by purgation. It is obvious that such a "sick fit," as this acute indigestion is not inaptly termed, is not to be arrested; but rather encouraged. After the brunt of the attack is over some bland and fluid form of food is very desirable, such as boiled sago, with milk or beef-tea. In milder cases these measures may be all that is required. In other cases, however, the suffering is such that it becomes necessary to resort to emetics to unload the stomach, by exciting vomiting. As Dr. Allchin has shown:—"The excessive ingestion of carbo-hydrate food, whether as starch or in the form of sugar, is liable seriously to modify the progress of digestion in the stomach, and thus to affect the character of the chyme. There is good reason to believe that in the earliest stage of normal gastric digestion the prevailing acid in the process is lactic, derived mainly from the carbo-hydrate food. Gradually this is replaced by hydrochloric acid, which alone is found after the middle of the period occupied by the digestion of an ordinary meal. Should the source of the lactic acid be unduly excessive, the predominance of the hydrochloric acid is likely to be delayed, and perhaps not attained, with the result of very considerably interfering with the proper digestion of the proteids in the stomach, and their consequent appearance in the chyme, ill prepared for tryptic digestion. Moreover, when lactic acid is formed in the stomach to any considerable extent, as it is likely to be when there is very much sugar present,

further organic fermentations are set up, with the production of various acids, especially butyric, which escape in the chyme, and are probably a further source of disarrangement of the intestinal digestion. Somewhat in contrast to the previously mentioned condition—viz. excessive proteid food, where the ill effects, so far as digestion is concerned, are produced in the intestine—here, where carbo-hydrates are in excess, the dyspeptic results are gastric in situation, or at least are so primarily."

§ 162. Emetics are of two kinds, the direct and the specific. The first division comprises agents like mustard, sulphate of zinc, and sulphate of copper, which excite the act of vomiting as soon as they are brought into contact with the lining membrane of the stomach. The specific emetics are those which also excite vomiting when administered by other means than given by the stomach. Such agents are tartar emetic, apomorphia, and ipecacuanha; they will produce emesis if injected subcutaneously. This division of emetics produces distinct impressions on the system generally. These so-called nauseant emetics are used rather in conditions where vascular depressants are indicated than for the mere purpose of unloading the stomach; for this last end mustard and sulphate of zinc rather are to be selected. By the administration of mustard in hot water, or the zinc in scruple doses, emesis is usually produced satisfactorily. It is not bad practice to give the zinc with ipecacuanha wine—a scruple to a drachm of the wine; this forms a certain and not too depressant emetic.

When the stomach has in it an unmanageable and troublesome mass it is well to get rid of it at once. If there is any intestinal disturbance remaining, then a dose of castor-oil, or other gentle purgative, may be given with advantage. It is well always after such acute disturbance in the digestive tract to be guarded about the nature of the food for some few days.

§ 163. Acute affections of the stomach are readily treated at the time, but the permanent conditions upon which acute derangements causally depend are often troublesome, and not rarely incurable. Gastric catarrh, ulcer, and cancer are affections the treatment of which requires great consideration and much thoughtful application of physiological knowledge. First, because the stomach is an organ whose complete rest is scarcely

compatible with a prolonged existence : in those cases where the irritability is excessive, it may be necessary to give complete rest to the stomach by feeding the patient by the rectum ; but this is a tiresome and unpleasant method of feeding. It becomes necessary then to give food in such form that it shall tax the stomach as little as possible. Next, it is of importance to give this viscus its proper intervals of rest ; that is, brief periods when it is not functionally active. This is somewhat difficult, as in all cases of gastric debility it is very desirable to give food in small quantities, and consequently at repeated intervals. Nevertheless if the food be such that it readily passes into the intestines, these intermittent periods of rest may be secured. In gastric catarrh the food should always be fluid. If there are any solid particles in it, there is ever present the danger that in being rolled over and over by the stomach the mass will become covered with the mucus, too freely formed ; and thus, being removed from the action of the gastric juice, rendered useless, because indigestible. Not only that, but the mucus-enveloped mass has to be got rid of either by vomiting or by purging. The food, then, must not be solid. In gastric ulcer the food should be of similar character for the following reasons. All movement of the stomach is liable to disturb the base of the ulcer, and so give rise to pain ; consequently the briefer and slighter the movements required the more this source of suffering will be avoided. Then again the presence of the acid gastric juice offends the ulcerated surface, and consequently the briefer the act and the earlier the quiescent and alkaline condition is resumed the better ; furthermore, repair goes on during the time the stomach is functionally quiescent, and the more such physiological rest can be secured the better for the patient. All this holds equally good of gastric cancer ; though unfortunately here all measures are but palliative. An impression exists that many cases which ultimately become undoubtedly cancerous had for years previously presented the features of chronic dyspepsia. Even when cancer is suspected, appropriate treatment will often afford relief for a time.

Much may be done in these cases by proper therapeutic measures. First of these stands opium. This agent checks nerve action not only in the centres, but in the peripheral

portions of the nervous system. It acts as a sedative to terminal nerve-fibrils. In the stomach this is markedly seen. If opium for any reason has to be given continuously for some time, by the mouth especially, there follows loss of appetite and constipation. This latter is due partly to the arrest of secretion, and partly to checking the muscular movements of the digestive tract. The loss of appetite is due to a similar action. The sensation of hunger is simply manifested by the stomach, and in cases of disease of the lining membrane of the digestive tract the sensations of hunger are often so aggravated as to lead to bulimia. This is well seen in cases of muco-enteritis, often following measles, where a child is ever eating; a little only of the food so greedily consumed is digested, and the more the child eats the worse it thrives and the sooner it dies. This species of gastro-intestinal irritability is not rare in advanced phthisis; and the development of an inordinate appetite in these cases is a symptom of the worst omen. In such cases opium is clearly indicated. If there be much catarrh it may be given with astringents, as in the form of compound kino powder. It would at first sight seem that the opium and astringents would lock up the bowels too much; but in actual practice it is not so. These agents seem to act especially on the diseased surface and less upon the bowels than would be the case if no gastric catarrh existed. We have seen before that opium also tends to check secretion, and is good for that action also when excessive. In gastric ulcer, by arresting the digestive movements, opium also gives physiological rest; and so is eminently useful. Its local action on nerve-ends soothes the ulcerated surfaces. It gives relief in gastric cancer locally as well as generally; but here it must be given in different doses, for we wish to secure its general analgesic effects as well as the local action.

The proper use of opium in affections of the intestinal canal is a matter of much importance.

Alkalies are also of much service in the treatment of these various affections. They may be used with success in neutralizing the excess of acid in very acid digestion. In gouty dyspepsia potash is of the greatest service. In some cases it may be necessary to give alkalies during digestion to relieve

the excessive acidity; even when acids and bitters are being administered before meals. There is nothing inconsistent in such practice, and it is often followed by the happiest results. Sometimes the acidity is found far down in the intestines, and then fixed alkalies, and especially chalk, are indicated. If soda or potash be given they may be absorbed, but the various preparations of chalk not being rendered soluble, or but very partially so, are useful even when the acidity is in the colon. Thus milk and lime-water is a famous old-fashioned combination, especially useful for infants with gripings from excessive acidity: or chalk may be added to the milk.

Bismuth is a most useful agent in the treatment of all chronic affections, especially where there is excessive secretion with irritability, in the gastro-intestinal tract. This has long been known; but we are as far as ever from knowing how these results are brought about. Most of the bismuth passes out by the fæces, consequently one is inclined to the belief that it exercises some local sedative action upon the mucous tract. This view is confirmed by its use in gonorrhœa as a local application; and its good effects in some persistent ulcerations, especially of the face, in the form of bismuth ointment. In gastric ulcer it is useful, in catarrh it is also useful; it relieves gastric pain and intestinal irritation. It is of much service in all cases where there is irritative dyspepsia with malnutrition. The old form—

Bism. Trisnit. gr. x.
Mist. Acaciæ, ℥i.
Inf. Calumb. ad ℨi.

three times a day before food is an excellent measure, and is often to be preferred to soluble forms of bismuth. In middle-aged persons it is often well to add ten grains of bicarbonate of potassium to each dose, especially when there is present a condition of lithiasis. In many cases too it is well to add ten grains of bicarbonate of sodium to each dose, especially where there is much gastric irritability, and the tongue is raw and denuded of epithelium. Bismuth may be added in a dose of ten grains to an equal quantity of compound kino powder in gastric catarrh. In troublesome irritative diarrhœa ten grains

of bismuth with an equal quantity of myrrh is a good combination. Indeed bismuth is a most valuable drug in many ailments. Hydrocyanic acid is often of service. In some cases of irritative dyspepsia bromide of potassium is of great use. When there is much irritability of the stomach a mustard blister, or a mustard leaf, applied to the pit of the epigastrium every night at bed-time, is an excellent measure. In cases of intestinal irritability turpentine stupes, and similar applications to the abdomen are often of service. Subcutaneous injection of morphine, or the formation of a blister over the region of the stomach, and subsequent dressing with morphine, may be indicated in some severe cases.

§ 164. The greatest matter in all these cases is the food. This must be bland, that is, pleasant and free from irritating properties, even when spiced food is craved after. It must be fluid, in order to pass readily through the stomach, and to call out as little functional activity in the diseased organ as possible. It must be nutritive and really digestible; that is obvious. Consequently milk and seltzer-water, especially where the milk is too constipating, or lime-water, is an excellent form of food; or even prepared chalk, or magnesia in powder in other cases may be added to the milk. Or milk may be thickened by having the powder of a plain biscuit stirred into it; this is very nice in gastric ulcer. Or sago or arrowroot may be boiled and then mixed with the milk, or they may be thoroughly boiled and a little beef-tea or meat-juice may be added. Beef-tea or chicken-broth alone are not desirable; they contain almost no force-bearing food, but with sago, arrowroot, or biscuit-powder they become suitable articles of dietary. The great thing to be aimed at is to procure a food which will readily pass through the stomach, either giving the stomach no trouble or very little. Nitrogenized food must always be in fluid form; and the hydrocarbons, to be acted upon by the saliva and the pancreatic fluid, should be given in that form that shall least task the stomach, and be least likely to be covered by mucus in catarrhal conditions. Meat-juice, in the many excellent forms now in the market, is very digestible, even by a very feeble stomach, and meat already digested is very useful; but that starch is contra-indicated in dyspepsia is foreign to our experience.

Until we know something more of indigestion from defect in the saliva or pancreatic secretion, we can only think of the digestive processses going on in the stomach, more or less imperfectly. The stomach, however, is a mere moving bag as regards the digestion of starch. If the starch be given in boiled form, or better still, after having been baked, as is the case with many excellent foods now in the market, it is readily digested. Such foods are as desirable for dyspeptic adults as they are for the feeble digestive power of the infant. Intractable dyspepsia is usually as much the result of defective knowledge in the practitioner as defective power in the assimilative processes of the patient. Beef-tea and meat-juices are all very well, but they possess small value as foods—either for the production of heat or mechanical power; and they should always be combined with some form of partially digested starch, in order to raise their food-value. A small quantity of baked starch added to beef-tea or meat-juice gives it increased value, or a pinch of sugar may be added. But much pains as well as acquired skill from practice are requisite in the treatment of dyspepsia; as well as patience. Of all things to be avoided is meat cooked a second time. To a dyspeptic, a hash made with cold, previously cooked meat is simply poison.

The food must be given in small quantities and at repeated intervals. If a tablespoonful of milk is rejected by an irritable stomach, a dessertspoonful should be tried; if that is too large a quantity, a teaspoonful. Any one of much experience knows how desirable it is to so treat an irritable stomach, and of the hairbreadth escape of many a patient. Another point to be remembered in the treatment of these cases is this:—a fortnight's careful self-denial and strict dieting may be neutralized and thrown away by one single act of indiscretion; and all has to be done over again. Especially is this apt to occur when cases are doing well, and the patient is becoming too confident; after one or two mistakes the patient is more careful, but then the convalescence is apt to be very tedious. Another point bears upon what has been said a few sentences back, and that is to remember that the stomach is a hollow muscular viscus; and so not to distend its walls more than is necessary. In febrile conditions and in the thirst of advanced cancer the patient will, if

permitted, gulp down considerable quantities of fluids, which are immediately rejected. Here pieces of ice relieve the dry pharynx and the consequent sensation of thirst; while the cold fluid, slowly trickling into the stomach, is grateful, and does not excite vomiting; but is absorbed as fast as it passes into the stomach.

Sometimes gastric irritability and vomiting are the consequences of distant irritation, as an irritable ovary, the vomiting of pregnancy, or that caused by calculus in the kidney, or a blow on the genitals. In such cases it is desirable to treat the stomach carefully; but at the same time it is very necessary to resort to those agents which lessen nerve conductivity, as bromide of potassium. Also removal of the irritating cause is a very proper measure. All that has been said about reflex cough applies here to vomiting. Finally, no condition of dyspepsia or intestinal irritability will ever be relieved, and got rid of, if the bowels are not properly unloaded. As long as a constipated and loaded condition of the bowels, and especially the colon, exists, so long will the dyspeptic state persist. A pill at bed-time, a tumbler of Hunyadi Janos water or some other laxative, on getting out of bed in the morning, or even a tumblerful of cold water alone, especially for women who habitually take too small quantities of fluids, are excellent measures; or an enema may be resorted to if preferred, or more desirable. In women dyspepsia is usually complicated by vaginal discharges, which must always be energetically treated. Dyspepsia is often of reflex origin, and is almost invariably of this nature when found along with a perfectly clean tongue. Such dyspepsia is found in women almost solely, and is of ovarian or of uterine origin. Such reflex disorders of the stomach are very frequent, and are often obstinate and intractable, because their nature and origin are forgotten or overlooked.

§ 165. We may now proceed to consider those disturbances of the digestive canal which are associated with the liver. And at this point may be discussed profitably the function of the liver and the disturbances of that organ. The liver performs three distinct functions: (1) the storing up of glycogen; (2) the oxidation of albuminoids; and (3) the formation of bile. It is at once a storehouse and a furnace. Without attempting to

pursue very far the subject of the functions of the liver, it may be said that the liver is found in lowly forms of animals, and is a very important organ. In its lowest form, it consists of glands attached to the mid-gut below the stomach, while coloured epithelium called the "liver," is found in the cælenterata. In the higher molluscs the liver is a separate organ connected with the digestive tube by its ducts. Placed below the stomach, it is probably as important that the food taken be properly digested in that organ before the liver takes its part, as it is important for the stomach that the food be sufficiently masticated before being received by it. As bad teeth frequently cause indigestion, so imperfect assimilation may be a cause of hepatic disturbance. The sugar taken up by the portal vein is converted by the action of the liver into glycogen, a substance like dextrin in composition, and which is an insolube form of sugar. It is found in greatest quantities after meals. Without the liver the blood would be constantly surcharged with sugar or famishing; by means of it the sugar furnished from a meal is stored up in an insoluble form and gradually given off as the organism requires it. It is like a reservoir which gathers the waters of floods, stores them and gives them off during rainless periods. By means of the liver, instead of one slow meal animals are enabled to eat at intervals; without which the higher forms of life would be unattainable. The liver is then in one sense the coal-cellar of the organism. This is its first function. If sugar is produced more rapidly than the liver can dehydrate it into glycogen, it finds its way out by the kidneys, and constitutes one form of glycosuria. This sugar is common in the urine after meals, especially with stout persons. If it is present in small quantities, it produces no indications of its existence; but if in considerable quantities, it produces the symptoms associated with diabetes. When the liver is unable to convert the sugar into glycogen, genuine diabetes is the result, and the body wastes—unless other food is provided in sufficient quantities. Glycosuria may be of no significance—be indeed a species of waste-pipe—or it may be the consequence of a very grave disturbance in the hepatic function endangering life. Diabetes is then a disturbance in the glycogenic, or first function of the liver.

The oxidation of albuminoids is the second function of the liver. The albuminoid materials of our diet are converted into peptones by the action of the gastric and pancreatic juices; from these peptones the tissues of the body are fed, the surplus is broken up by the liver into glycogen and nitrogenized waste, as leucin and tyrosin, which by further oxidation are converted into uric acid and urea. In the liver, too, worn-out blood corpuscles and tissue *débris* are burnt, more or less completely. The destruction of spare and waste albuminoids is the second function of the liver; in this respect it is a furnace. Murchison points out these two facts, (1) that in functional disorder of the liver lithates are found in considerable quantities in the urine; and (2) that when a large portion of the liver is destroyed, as by cancer, for instance, the amount of urea is largely diminished. The liver then is involved in all those disturbances which are associated with defective oxidation of albuminoids. Where there is a large sediment in the urine there is imperfect oxidation, either from the liver having more albuminoids to burn than it is equal to, *i. e.* a large surplusage of food; or from inefficient action, so that it cannot perform its duties in a perfect manner. Lithiasis may be induced in a person with a good, well-acting liver, if it be persistently overtaxed by an excess of nitrogenized food, as of brown meats; or it may be the outcome of a fairly well adjusted dietary with an insufficient liver, or a liver not very active functionally. Where the liver action is imperfect, large functionally active kidneys may cast out lithates freely, and so depurate the blood and ward off that waste-laden condition of blood known as lithiasis. In all cases of lithiasis it is well then to reduce the albuminoids taken as food to the minimum of tissue wants. Lithates cannot be produced from a dietary of hydro-carbons without nitrogen; on the other hand, when the dietary is rich both in hydro-carbons and albuminoids, then lithiasis is readily produced. Hydro-carbons oxidize but slowly when in combination with nitrogen. The more readily oxidizable hydro-carbons burn readily and consume the oxygen of the blood, leaving the albuminoids in an imperfectly oxidized form. In some countries, as on the pampas of South America, the food consists almost entirely of flesh, yet lithiasis is not common. The gaucho has no hydro-carbonaceous food to pre-

vent or obstruct the oxidation of the albuminoids, and though a flesh-eater in a hot climate, does not suffer much from lithiasis. In most tropical countries the dietary is very free from albuminoids; it is when the European takes with him his craving for albuminoids that his liver in time becomes the seat of disease. When the dietary consists exclusively of hydro-carbons the second function of the liver is not overtaxed in a hot climate where oxidation is imperfectly performed. Tropical liver disease and functional liver disorder in all climates are associated rather with the second function of the liver than with the first, or third. This statement may be met by another, viz. that a little rich food, that is, rich in either sugar or fat, is very commonly the cause of liver disturbance. Quite so, but it is the impaired oxidation of the nitrogenized elements of food by the surfeit of hydro-carbons which causes the disturbance; if the excessive meal contained no albuminoids, the disturbance would not have followed.

And this leads up to the question of "biliousness." There are two forms of biliousness occurring in totally different classes of beings. There is that form of biliousness which really is indigestion, and where two hours after a meal the urine is laden with lithates. Such is not uncommon in persons of florid complexion who live too freely—that is, for them, and where the oxidation is insufficient. In such cases there is dyspepsia present. This is one form of liver disturbance, where the liver functions and the kidney functions overlap. The kidneys can supplement the defective liver-action if they are very active, and throw out of the blood imperfectly oxidized nitrogenized waste very freely, and so efficiently depurate the blood. Then there is the well-known form of biliousness, chiefly occurring and most marked in persons of the bilious diathesis—persons with yellow skins and dark hair. Here the digestive tract is chiefly disturbed; and we find the typical bilious attack—headache, furred tongue, disturbance of the alimentary canal, loss of appetite, vitiated stools, a bad taste in the mouth, with fulness over the hepatic region; the urine not throwing down a sediment, but being high-coloured from the presence of bile-acids. The bile-tinged hue on the glossal epithelium tells of the bile-acids circulating in the blood in excess. It seems

curious that the chemical composition of these bile-acids has not provoked more thought as to their origin than has actually been the case. The bile-acids in human bile are two—glycocholic acid and tauro-cholic acid. Both acids are derivatives of albumin, and contain nitrogen; and tauro-cholic acid, to which the bitter taste of bile is due, contains all the sulphur of the bile. These bile-acids are formed by the liver, and their production is part of the third function of the liver; but the different functions overlap each other, and the bile-acids, as nitrogenized *débris*, are connected with the second function of the liver. The bile-acids are forms of albuminoid waste; both contain nitrogen and one contains sulphur. As urates and urea circulate in the blood, when not in excess, without causing disturbance, so the bile-acids also, when not in excess, do not make their presence felt. But when in excess—when the bile is not poured freely into the digestive canal, or is re-absorbed, so as to circulate in the portal circulation in excess—then they cause the well-recognized symptoms. But their parentage and that of lithates is the same, viz. the albuminoids of food; and if the food be not rich in albuminoids the patient cannot be "bilious," though rich hydro-carbonaceous food may apparently be the exciting cause of the attack; really, as pointed out before, the biliary disturbance is brought about by the hydro-carbons combining with the oxygen, leaving the less readily oxidizable albuminoid matters unoxidized. The chemical composition of the bile-acids, like that of lithates, points whence they are derived, and gives indications for striking at the root of the condition by regulating the dietary. When the liver is injured by disease, slight errors in diet are followed by distinct biliary derangement, as in those bilious persons now under consideration. They probably possess congenitally small livers, or livers imperfect in function, and consequently are deranged by an amount of food which most persons can dispose of with facility. Most people have more liver, just as they have more lung, than is absolutely necessary for the due performance of its function. But in others, not unfrequently the offspring of gouty parents, the organ in its natural condition seems only just capable of performing its healthy functions under the most favourable circumstances,

and functional derangement is at once produced by articles of diet which most persons digest with facility. Where there is a small, or functionally imperfect liver with small or inactive kidneys, then the condition is one calling for much sympathy; but admitting only of very little in the way of treatment, except the negative treatment of rest. Such defective organisms, or "poor creatures" as they are sometimes termed, can only exist under favourable circumstances. Probably Mr. Irwin's "Sister Anne" in *Adam Bede* was an organism of this description.

Where the assimilative powers are so feeble and the excretion of waste so imperfect, the organism can do little more than exist; it has no spare power for the performance of work.

The practical lessons taught by this consideration of the disturbances of the liver in relation to its second function are these. First, of all things, all substances containing nitrogen must be avoided, whether lithates or bile-acids are the source of the systemic derangement; and the dietary for the bilious is the dietary of the gouty—if they could only be brought to think so. Their disturbances, however, are so associated with food rich in sugar or fat, that it is next to impossible to convince them. Yet it is essentially the albuminoids, not the hydro-carbons, which upset them. In those cases where the stomach will tolerate albuminoids only, then of course they must be taken; not because it is desirable, but of necessity. All meats should be avoided, and fruits and farinaceous foods, as stewed fruit with cream, or a milk pudding, should be taken: easily digestible fats being good. It is clear too that exercise—leading to more perfect oxidation—ought to be taken as far as the powers permit. More food can be taken in a low temperature than in a high one. In tropical climates the food of natives is almost entirely hydro-carbonaceous; and if albuminoids are taken they are mostly derived from vegetables, or from milk. Limited quantities of food of any description are best suited to tropical climates, where the body-requirements are small. Careful, slow mastication, digestible articles of food, and rest after meals so as to permit of as perfect assimilation as is attainable, are desirable, in order to reduce the demands upon the liver to a minimum. Imperfectly elaborated peptones probably increase the work of the liver. Then as to

beverages. It is notorious that small quantities of apparently simple food, as eggs, or milk, will disturb bilious persons, whether from bile-acids or lithates; equally well-known is the effect of alcoholic beverages. A glass of port in one, a single glass of Champagne, or Sauterne in another, a glass of malt in a third, will set up serious hepatic disturbance. Each must learn to avoid his own poisons.

As for medicines, alkaline saline purgatives are indicated. They should be taken in the form of Vals or Vichy water, or Hunyadi Janos, or a combination of Rochelle salts and sulphate of sodium every morning on rising; together with a tumblerful of water, cold, lukewarm, or warm, according to the patient's tastes and requirements. After a copious liquid motion before breakfast, and a second one after, a bilious person usually feels light and fit for work; and, moreover, can digest his food better, and take greater quantities without disturbance. Such treatment requires a little time to make its good effects manifest, and the patient must be encouraged to persevere. So long as there is a bitter taste in the mouth in the morning—probably due to taurocholic acid—the purgation must be continued. When the tongue is clean and the bitter taste gone, then the purgation need only be occasional. However anæmic such patients are, iron is generally contra-indicated. After the bowels are put right then some chalybeate may do good; but it must be in small quantities. Vegetable tonics, quinine or strychnine in gentian, with or without aloes, and carbonate of ammonium, agree with bilious persons much better than chalybeates, as a rule. As to the utility of mercury in these cases there does not exist much doubt. A reaction has set in from the abuse of mercury, but it has not gone too far. Murchison thought that mercury acted on the waste albuminoids in the liver much as it does on syphilitic gummata and effused fibrin, making such change that the material is more easily removed. Further, too, mercury sweeps away the bile from the upper bowel and so prevents its re-absorption. A dose of calomel occasionally, or a little calomel and colocynth pill at night, followed by the alkaline saline purgative on rising, are desirable. One unfortunate effect of the blue pill and black draught arrangement was the immediate relief furnished, so

that the patient was indifferent as to his food. It is better to do away with the necessity for the pill and draught by a careful dietary. In these last remarks the third function of the liver has been included as inseparable from the right consideration of the matter.

Now as to the third function of the liver itself—the secretion of bile. This complex body is alkaline in its reaction, the bile-acids being combined with soda. What its action is, is not yet thoroughly known; it has some effect upon sugar and upon fat, and it aids the action of the pancreatic juice upon albuminoids. Thus during the transit through the small intestine by the action of the bile and pancreatic juice assisted probably to some length by the succus entericus, the proteids are largely dissolved and converted into peptones, and other products, the starch is converted into sugar, the sugar possibly being in part further converted into lactic acid, the fats are largely emulsionized, and to some extent saponified. Such are the uses of bile in assimilation, while it corrects putrefying fermentation and is a stimulus to the bowels; constipation of an obstinate character being the common result of arrested hepatic action. The composition of the bile varies in different animals; taurocholic acid is the characteristic of the bile of carnivorous, glycocholic acid of herbivorous animals. The sulphur products of taurocholic acid are linked with the offensively smelling fæces of meat-eaters, whether human or animal; and also probably the difference in the urine of animals is due to the absence of sulphur-carrying materials. In certain cases in old women the urine is very offensive immediately when passed. This is usually accompanied by drab-coloured stools and inactivity of the bowels; there is generally pallor found therewith. Probably some sulphur product of bile is the cause of the offensive odour. Bile has its uses; even that portion of it which is cast out as excrementitious.

So much for the third function of the liver. Now hepatic disturbance with this third function demands our attention. As to those conditions termed "biliousness," they were included in the second section, and do not require to be described again. The functions of the liver overlap each other at some points. There are other derangements associated with the presence of bile in excess, especially jaundice. Here the tissues of the

body are stained with bile, while the stools are pale for want of it. The urine is laden with bile so as to stain the linen; the milk also leaves a stain. The conjunctivæ, the mucous membranes, and the skin, all are tinged yellow. As to the causes of jaundice, one is mechanical obstruction of the gall-duct, as by a gall-stone or the pressure of a tumour. For the latter little can be done. For the removal of gall-stones, which largely consist of cholesterine, chloroform and æther have been advised, as they dissolve cholesterine out of the body; but they have failed, as may be supposed, when given internally. Alkalies, as soda or potash, and especially sodic salts, either as mineral waters or in medicinal solutions, are chiefly relied upon for the removal of gall-stones. Lotions of opium, or belladonna, or chloroform liniment applied over the gall-bladder afford relief. Then there is catarrh of the gall-ducts where jaundice follows a cold. Mucous inflammation may follow a cold in the lining of the gall-ducts as it may in the bronchial lining membrane, or that of the stomach or bladder; and probably this is the form of jaundice of a temporary character seen in young healthy subjects. Then there is jaundice commonly without much disturbance of the general health. Of all plans of treating jaundice of this character emetics are the most successful. A scruple of ipecacuanha powder, or an ounce of the wine, with a quarter of a grain of tartar emetic and a few grains of calomel every morning, will produce free emesis. The pressure on the liver in the act of vomiting is good. What other effects are produced we do not know, but good results follow. Then hydrochloric acid with strychnine three times a day, is useful; it is supposed from the action of the free chlorine. By such measures the jaundice disappears and the stools become darker. The strychnine is desirable to counteract the depressing effects of bile salts in the blood in any quantity. A good combination is the following:—

Acid Nitro Hydrochlorici, Dil. ♏x.
Sodii Sulphat. ℥i.
Liq. Strychniæ, ♏iv.
Sp. Chloroformi, ℥ss.
Aq. ad ℨi. ter in die.

The food to consist of slops, gruel, milk, or light broths. When jaundice is due to chronic disease of the liver it is less tractable; but the same measures afford relief even when cure is out of the question. Jaundice is not rare with the enlarged nutmeg-liver or hob-nailed liver of alcoholism; at other times it is the outcome of hepatic congestion leading to a growth of the connective tissue from valvular disease of the heart; or it may arise from syphilitic growths in the liver. In elderly persons it is not uncommon as one of the outcomes of chronic cirrhosis of the liver where there is a general development of interstitial connecting tissue in the different viscera. Here there are generally to be found tube-casts stained with bile—very pretty microscopic objects. In such cases a mixture as follows is good:—

Sodii Sulphat. ℥i.
Sod. Pot. Tart. ℥ss.
Tinct. Nuc. Vom. ♏x.
Inf. Gentian, ℨi. ter in die,

to be followed by a draught of water. A pill containing some iodide of mercury at bed-time is often of service. Marked results often follow the internal administration of the green iodide of mercury in doses of a grain, or half a grain, three times daily. Here the treatment of the jaundice is that of the disease upon which it depends. Nitro-hydrochloric acid baths are often of service. Jaundice may rise from mental causes. It may appear acutely from rage, fear, or mental anxiety. An increasing experience is teaching, with some very cogent arguments, that mental anxiety, overwork, and worry affect the viscera and their functions; and, when long-continued, lead to permanent changes. Clifford Allbutt's view that renal cirrhosis may have a nervous origin in mental conditions, may fairly be extended to the chronic diseases of other viscera. It is no part of our intention to go into the diseases of the liver; but merely to consider them so far as they furnish indications for treatment. If the bile circulating in excess in the intestines and liver be removed by spontaneous purging, or by mercurial cathartics, great relief is experienced in bilious conditions. Very often vomiting leads to bilious discharges by the com-

pression to which the liver and gall-bladder are subjected in the act of vomiting. Such bilious attacks of sickness and purging are frequent with certain persons, who are denominated by their friends "bilious individuals." They are natural curative efforts, by which the system is benefited. When these attacks do not come on, and there is malaise, headache, depression, a foul tongue with a bad taste in the mouth in the morning, and a high-coloured condition of the urine—partly due to excess of lithates, partly to bile-colouring matter—purgation with mercurials gives much relief; and brings away bile-laden stools. The action of the mercury is to sweep away this bile, going round and round in the intestino-hepatic circulation, and so at once to get rid of the offending matter. By its action on the duodenum and upper part of the small intestines we can understand its efficacy and the resort to its use by the bilious. But unfortunately it is not possible to secure one action of a drug, and evade its other actions; and the consequences of indulgence in mercurials render it desirable that the bilious should be chary about resort to them—though the relief given by them is decided and unquestionable.

Whatever the formation of bile and its uses in the economy, we know that it is intimately connected with the assimilation of food, and that indulgence in rich dishes, either fatty or sugary, produces a bilious condition. It is really the albuminoid food which produces biliousness. The nitrogenized waste gives the lithates, the sulphur waste is found in the bile-acids. Rich hydro-carbonaceous food will interfere with the due oxidization of albuminoid matters. Conversely, abstinence from such dishes furnishes relief from the wonted bilious attacks; and if the European in India would live on the food of the native, in the same scanty proportions, he would know comparatively little of the bilious disorders so common in that country. Exactly the same occurs in England, and biliousness usually implies the possession of sufficient funds to produce the disturbance. In all cases there is an excess of bile; and it must either be got rid of by purgation, or its formation must be arrested by abstinence. In many cases it is desirable to combine these measures. If the mercurial purgation is not accompained by a restricted diet, the condition may persist, until organic changes in the liver

will ultimately be set up. If the bilious individual be a spare woman, who says, in her own vernacular, "Everything I take turns to bile," and whose speech is not very far from the mark, it is very desirable to purge this poor creature. It will be found, as a matter of fact, that, to reduce the food in such case till bile is no longer freely produced, means a practical partial starvation of a miserable character. If food be allowed in fair quantities, and at the same time free action upon the bowels be maintained, so as to get rid of the superfluous bile, the power of assimilation in the patient will improve, and the general condition will be benefited. For such purpose a pill at bed-time, not necessarily a mercurial one, and some alkaline saline purgative in the morning, are the best means, and they may be continued for weeks with advantage.

℞ Sod. Sulph. ℥i.
Sodæ Pot. Tart. ℥i.
Inf. Cascarillæ, ℨi. ter in die,

will often produce very good effects. Indiscretions of diet, however, are to be avoided. Such are the measures most suitable in my experience to the needs of the habitually bilious. Nitro-muriatic acid is often of great service; and strychnine best relieves the mental depression.

§ 166. Sir Joseph Fayrer, speaking of diseases of the liver in tropical countries, says:—"In reference to the treatment of the functional derangements of the liver that arise from congestion, and I think more especially in that form in which it is somewhat chronic and accompanied by anæmia, such a condition, in short, as is so frequently seen in persons who have lived long in hot malarious climates, like India, the West Indies, and the coast of Africa, I may say this. Beyond mere swelling of the liver from engorgement with blood, other changes—fatty or amyloid—will no doubt supervene, and it is often difficult to determine how far the functional is due to the structural change. The treatment I generally find most effective is attention to diet and drinks. Avoid much fatty, sugary, and alcoholic fluids. No beer. Claret and water for drink. Warm clothing, so as to keep the skin moist. An

occasional dose of colocynth and calomel, or blue pill, and every morning, or every other morning, a dose of saline aperient, such as sulphate of magnesia, with quinine or gentian, sufficient each time to produce two or three loose motions. Counter irritation by tincture of iodine over the loins. When the portal circulation is relieved some preparation of iron may be very useful. The urine is a good test of the hepatic condition; it will improve under the above treatment, but it is well to give the patient some alkaline waters—Vichy, Vals, or Carlsbad. Albuminuria will be present at times, when the kidneys, like other abdominal viscera, are congested, or are irritated by lithic acid. Too much importance is attached to this symptom in some cases. Albuminuria may be functional, and pass away like the other symptoms." Such practice is the result of long experience, and the necessity for unloading the liver, especially ere iron can be given satisfactorily, is clearly laid down.

The views of Lusanna as to the accumulation of malarial poison in the portal circulation give an additional interest to the subject of purgation in biliary congestion, especially in malaria subjects. Possibly even an occasional emetic might not be out of place in these cases.

The great matters in the treatment of the bilious are the regulation of the amount and the character of the food, and the systematic use of alkaline saline purgatives. By such means the headache, the languor, the sense of misery, are all relieved. The patient eats more, assimilates more, and becomes a new person by judicious yet energetic purgation, especially in the morning.

The above account of what is to be done in a large class of patients may seem unduly short, but there is no alternative between a brief summary, which, if brief, is distinct, and a lengthy dissertation, for which there is not space. Popular as well as professional experience has pronounced its verdict as to the association existing betwixt biliousness and the necessity for purgatives.

Ere leaving this subject it may not be out of place to describe a form of ailment often mistaken for biliousness. Prout says:—"When acidity prevails in the lower portion of the intestinal canal, and particularly in the cæcum, the treatment must be

modified to meet the circumstances. The soluble antacids in this case have comparatively little effect, from their being neutralized and absorbed before they reach the seat of the affection; hence the insoluble antacids, and especially magnesia, will in general be found more useful in such cases. The shortest mode, however, of getting rid of the immediate inconvenience of acidity in the lower bowels is usually to inject a pint or two of warm water (or of soap and water), and thus of removing the offending cause. By this simple remedy I have often seen the severe nervous headaches and other unpleasant symptoms usually accompanying acidity in the lower bowels immediately removed. Those who suffer from such causes usually require the aid of purgatives, which in general are better taken at bed-time. Purgatives of a mild but effectual kind, such as the compound decoction of aloes with magnesia, often suit well; as do pills taken at a late dinner, if duly adjusted to the circumstances of the case." All are familiar with acidity in the intestines of infants, and of the numerous combinations of remedies to meet it. Gregory's powder, aromatic chalk powder, and dozens of quack remedies of unknown composition, but all containing alkalies with carminatives, testify to the widespread acquaintance with acidity in the primæ viæ of infants, and of the measures best calculated to relieve it. In young infants bicarbonate of potassium (gr. ii.) with Cajeput oil (♏i.) in dill-water (℥ii.) is a favourite measure; together with some fixed alkali in the milk.

§ 167. One of the commonest of maladies is constipation. This must be kept distinct from costiveness, which means merely scanty fæces; where forms of food furnishing more bulky waste material are indicated. Constipation is a troublesome malady. When present, all the functions of life are languidly performed; the brain is sluggish, and the digestion impeded. It may be itself a consequence of brain disease; and all cerebral affections combined with obstinately constipated bowels are serious. In these cases an open state of the bowels is a *sine quâ non*, but sometimes it is very difficult to move them. Free action of the bowels gives relief even when cure is unattainable. In many cases very large doses of purgatives are required, much larger than those in ordinary use. In such

cases the practitioner must go on increasing the dose until a point is reached that is effective. Many stop when the maximum dose in the posological table has been given; but this is pusillanimity. Sometimes constipation is followed by diarrhœa, the inaction of the bowel being succeeded by a period of excessive activity; and this condition is apt to become permanent. Here the loading of the bowel must be prevented by laxatives, and then the diarrhœa will cease of itself.

Purgatives.—These are agents which act upon the bowels in such a manner as to increase peristalsis, and cause a freer flow of intestinal secretion; the consequence of which is that the motions become more numerous and of less solid consistency. Much discussion has gone on as to whether purgatives merely increase peristalsis, and so sweep away the contents of the small intestines in their fluid state; or whether they increase the secretion from the intestines. It is now ascertained beyond doubt that they do both. To aid their action upon the intestines nux vomica is often added to purgatives. Purgatives are furnished by both the mineral and vegetable kingdoms. They may be given alone or together. They differ much in action, and therefore it is not always a matter of indifference which is selected. Still the amount of dose makes up for much of the difference.

The majority of purgatives derived from the vegetable kingdom belong to the class of cutaneous irritants—*e. g.* croton oil, gamboge, elaterium. This irritant effect leads, when the drug is taken internally, to increased peristaltic movement and to a rapid evacuation of the intestinal contents. The stimulation may be exerted on the mucous membrane itself or upon the motor ganglia which preside over the contractions of the intestines. Saline purgatives have an enormous advantage over purgatives of vegetable origin in not being irritant. It is probable that most of them act simply in virtue of their bitterness. The intensely bitter taste both of magnesium sulphate and of sodium sulphate is readily appreciated, even in very dilute solutions. Bitters excite the secretion both of the stomach and intestines. Gentian, quassia, calumba, and angustura administered immediately before meals improve the appetite and stimulate the powers of digestion. These drugs fail to

act as purgatives because many of them contain astringent principles, and they are commonly taken in small doses with sherry or gin, which by dilating the gastric blood-vessels facilitates absorption. The theory that the action of saline purgatives is solely to increase peristalsis is now abandoned. The natural purgative waters do not exert their characteristic action if the patient be confined to bed or less favourably placed for the passage of fluid into the intestines. In these cases the action of the aperient is materially assisted by massage of the abdomen, which facilitates the passage of the fluid through the pyloric orifice. The effect of bitter water upon the stomach is beneficial apart from the purgative action, and it is a common experience that patients whose breakfast ordinarily consists of a cup of tea and a piece of dry toast find that they can eat a good meal and digest it after a glass of let us say Hunyadi Janos water sipped slowly while dressing. With regard to the purgative effect, the bitterness of the water is responsible for its excito-secretory action, whilst its low diffusibility impedes the re-absorption of the fluid. As a joint result of the stimulated secretion and diminished absorption there is a largely increased accumulation of fluid in the intestinal tract, which partly from the effects of gravity and partly from a gentle stimulation of the peristaltic movement excited by distention, reaches the rectum and produces a copious and comfortable evacuation. Some saline purgatives affect the peristaltic movements so slightly that they are powerless to give the secreted fluid the necessary downward impetus, the result being that there is risk of re-absorption with attendant dangers of griping and discomfort. It is rarely expedient to employ a single member of this group; much better results are obtained by judicious combinations which occur in the natural purgative waters. In the cases of Hunyadi Janos water a half-tumblerful is diluted with an equal quantity of boiling water and sipped slowly whilst dressing in the morning, with the result of one copious and easy evacuation immediately after breakfast. The dose can be regulated to a nicety, and it can be taken month after month without the slightest risk of exciting a catarrhal condition of the intestines.

When it is merely desired to maintain the action of the

bowels at about the normal state, it is common to order a fig, prunes, oatmeal porridge, manna, and similar matters. All oleaginous bodies increase the action of the bowels; while milk and farinaceous foods have an opposite tendency. Consequently we eat starch and fruit together. Olive oil is a most gentle purgative, and the best of all in very irritable conditions of the bowels; next to it comes the universal castor oil, too often rendered more powerful by a certain admixture of its potent congener, croton oil. A useful laxative for people with a tendency to gout is the popular hashra tea. Other gentle purgatives are found in magnesia; and combinations of this agent with potash and soda in the form of mineral waters. These last can be so arranged that patients can find out what is the dose required in their own case, and regulate it accordingly. Such natural combinations are often simulated by medicinal agents; it is often found, however, that these artificial substitutes are far less efficacious than the natural waters. The explanation of this lies in the dilution—in the amount of water. If a good-sized tumblerful of water be swallowed with each dose, the desired effects would more commonly be secured. Seidlitz powders, citrate of magnesium, and many other pleasant laxatives are largely in use. These mineral purgatives are used rather to procure easy and regular motions, than for the purpose of producing catharsis. When this latter is sought, the vegetable agents senna, jalap, scammony, colocynth, elaterium, and gamboge are resorted to. In small doses these agents increase the action of the mineral laxatives, as in compound jalap powder, senna and Epsom salts, gamboge and cream of tartar, &c., &c., all excellent and useful measures.

There are, however, some points about the use of purgatives which are of importance in practice. First comes the use of rhubarb. Of all agents to be selected for an habitual purgative this is the worst. If once resorted to, its use is necessitated in consequence of its secondary action; which is to cause constipation. It is an excellent purgative where any operation on the bowel or pelvic viscera is to be performed; for it first opens the bowels and then locks them up. A full dose of rhubarb is the thing here *par excellence*. Next, aloes has its peculiarities. Its action is chiefly upon the lower bowel, and, therefore, its

use is indicated to unload the pelvic circulation in cases of congestion there. From this action too it is very useful in ordinary habitual constipation from inertness in the lower bowel; for which it should always be selected as one agent at least. It also has some action upon the duodenum; and so is useful in biliousness, and as a part of a dinner-pill. Aloes goes well with alkalies and with iron. It is always used in first bringing patients under the action of chalybeates; it being a well-known fact that slight catharsis is desirable at the commencement of a course of iron. In allaying excitement in the reproductive organs of women aloes with potash or soda is useful. Then we have mercury, especially calomel, the most subtle and dangerous of all laxatives. The freedom from pain in the action of calomel; its "toleration" by the youthful system; and the remoteness of its pernicious consequences; have caused it to be a constant visitor, and even occupant, of the nursery. Yet it should be admitted under skilled medical supervision only. Mercury is invaluable in the treatment of congenital syphilis, no matter what the form of manifestation. But to the other ailments of infancy it is unsuited. Erethism, defective teeth, and a whole host of evils follow in the train of mercury, when administered freely to children. Calomel and grey powder are excellent in their place, but when improperly used they are objectionable.

§ 168. Then again certain special conditions call for special treatment. For instance, in the acute suffering often found along with constriction of the bowels, when the pouched gut above the constriction is in great activity to force the contents through the narrow opening, the proper thing is to give a full dose of laudanum along with large doses of sulphate of magnesia. The opium soothes the active pains of forcible contraction; while the salts liquefy the contents of the pouch, after which they readily pass the narrow portal. This is rational medicine, and in practice it is successful. In cases of constipation from ileus, the administration of purgatives is very reprehensible. In other cases catharsis is indicated to affect the general condition. It lowers the blood-pressure, it lowers temperature; it relieves venous congestion, especially in the portal circulation; while it is useful in defective renal action

as a compensatory eliminative process. Purgatives prove useful in many ways. They hurry the food out of the alimentary canal, and thus lessen the injurious effects of over-eating. By expelling irritating substances from the intestine they arrest diarrhœa, and remove headache and other pains, caused either by the abdominal irritation, or by the absorption of poisonous matters produced by imperfect digestion and decomposition of food. They relieve biliousness by removing bile, and are most efficient aids in the treatment of chronic poisoning by lead, mercury, or other metals. It is probable that pepsine and pancreatic ferment are absorbed from the intestine, and circulate in the blood, where the latter assists in the production of animal heat. They are then secreted anew by the stomach and pancreas, and do their work again. Purgatives lessen their quantity as well as that of the bile, and they are thus useful in fevers; but they injure old and feeble persons, both by their diminishing their calorific power, and impairing their digestion. They relieve inflammation by lowering the blood-pressure, and thus diminishing congestion; and they prove beneficial in dropsies, both by abstracting water from the blood, and diminishing congestion in the kidneys.

In the administration of purgatives in the old and feeble, it is of much importance to select the proper laxative agents; they should not be too depressing, and they should be combined with carminatives. Mineral laxatives do not suit the aged; old people say that they are too chilling. If given, say, as sulphate of magnesia, they should be given with spirits of chloroform, tincture of ginger, or cayenne, in cascarilla. Such also are the combinations best suited to the constipation common at the change of life in women. Carminatives—whatever their action—certainly take away griping, and for this end they are often to be preferred to hyoscyamus; though this latter is a pleasant adjunct to cathartic pills. Such carminative laxatives taken warm are good in aged people, and do not depress them too much. It is attention to these comparatively trifling matters which helps to make the successful practitioner—just as much as more solid attainments.

In many instances constipation is associated with an atonic, torpid, and dilated intestine, and then minute doses of

strychnine, or nux vomica, are indicated. A case is recorded where Ol. Croton, ℥i.; Gamboge, gr. 1½; Pulv. Capsici, gr. i.; Strychnine, gr. $\frac{1}{60}$; Ext. Al. Aquos. q.s., in a pill, were taken twice a day for two months. Then the oil was reduced to half a drop, and the strychnine increased, for two months; after which the oil was stopped, the gamboge reduced to one grain, and a quarter of a grain of dried sulphate of iron added. Here there was great abdominal distention, implicating the small intestines, which unfitted the man for labour; and further impaired a limited intelligence: the relief of this condition restored the man to a state in which he could again labour.

In the ordinary economy of life the condition of the bowels is a matter calling for considerable attention. To many people constipation is the plague of their lives; it and its consequences embitter their existence. Constant and unintermitting resort to medicine is wearisome and objectionable, but nevertheless unavoidable. The numerous quack pills testify to the general necessity for such agents. The introduction of granular effervescent salines has been a boon to many. A teaspoonful in the morning, on getting out of bed, in half a tumblerful of water is to many an effectual laxative. To others, again, all that is needed is a tumblerful of cold water, and especially is this desirable for ladies, who for social reasons consume much less of fluids than is good for them.

From experimental research Professor Rutherford has found that sulphate of sodium acts much more powerfully upon the liver than does sulphate of magnesia. This conclusion is in accordance with what clinical observation has taught us. Sulphate of magnesium is an excellent laxative, increasing the intestinal secretion, and "liquefying the stools," as older writers put it. There is an impression prevalent in the profession that sulphate of magnesium is not suited to children. Phosphate of sodium, otherwise "tasteless aperient salts," is an agent admirably adapted for children. If given with iron it must be with the ferric phosphate. Like sulphate of sodium it is apt to be deposited at the bottom of the bottle from cold; warmth re-dissolves it. This constitutes a drawback to the use of both agents. It is not well to give either in stronger solution than one in six.

Many persons take annual excursions to wells of purgative waters, at Harrogate, Carlsbad, &c., where they go in for a course of purgation, to their great benefit and comfort. For many this is a good and useful practice; and enables them to live the rest of the year in comparatively good health. A course of mineral waters at home is a good practice for those who cannot get to these wells; or when it is winter and it is not convenient to visit a spa. However attained, it is ever desirable that the bowels be kept open; and for this end it is well to have fixed times for defæcation, so as to secure the advantages of the force of habit.

§ 169. One of the commonest troubles of life is the opposite conditions of the bowels, viz., diarrhœa. It is not a chronic trouble, usually at least, like constipation; but it is frequent, and sometimes unmanageable, requiring for its successful treatment measures which shall be in accordance with its causation. It is desirable to consider the varieties of diarrhœa, and the remedial measures suited to each form.

Diarrhœa may be a salutary process; or an ailment serious enough to endanger life. Even when commencing as the first it may eventually be fatal. The bowel is not only the means by which absorption of our food goes on; but it is also a means of getting rid of excrementitious material. Moreover, when a mass of objectionable or indigestible food is consumed, diarrhœa is the natural means of getting rid of it. Such diarrhœa is very common among children, and is often preceded or accompanied by emesis. In the same way bilious diarrhœa is a natural means of removing superfluous bile. Here diarrhœa is decidedly a salutary, and not a morbid process.

Such is the diarrhœa which is occasioned in infants by the excessive curdling of their milk; a hard, firm, indigestible curd being formed, which no infantile stomach can break down and digest. This morbid curdling is at times the result of too hasty consumption of milk, so that it is not well mixed with saliva; at other times it is the result of preternatural acidity in the little patient's digestive organs; while at other times, again, it is the consequence of some disturbance in the mother's economy. When the morbidly curdled milk is rejected by vomiting and by purging, it is wrong to attempt to arrest the diarrhœa by astrin-

gents, chalk, and opium; such practice is bad. This is commonly seen in the diarrhœa of calves, where the busy, interfering farmer's wife tries to check the discharge; and if she succeeds in doing so, locks up an indigestible mass in the intestines, and produces enteritis. The same occurs in human infants. Instead of checking the diarrhœa it is advisable to give a dose of castor oil, which sweeps away the offending mass. The administration of such a purgative is often better than leaving the diarrhœa to itself, for this reason. The increased secretion excited by an irritant mass in the bowels is very often set up below the source of irritation, so that it is not successful in removing it; if a purgative be given, it sets up increased secretion above the offending matter, and so sweeps it away. By such means a troublesome and ineffectual discharge may be at once done away with. Having so removed the indigestible curd, the next thing is to prevent its formation by the administration of alkalies; if necessary, to the mother as well as to the infant. If the child be bottle-fed it is well to stick to the milk of one cow; and by such a change good often results in intestinal troubles. The Swiss condensed milk is a great boon to the children of towns; town-kept cows being so fed that their milk is often unsuitable for the purpose of infant feeding. This Swiss milk may often with advantage be mixed with lime-water, instead of ordinary water, especially in infants where the excessive acidity is persistent and intractable; or ordinary milk with chalk, or magnesia may be tried. It sometimes happens, however, that the diarrhœa thus instituted persists as an intestinal catarrh requiring its appropriate treatment; but before this subject is considered it may be well to review another form of diarrhœa which may persist in a like manner.

Diarrhœa is not rarely the consequence of a chill. Instead of the ordinary cold a sharp action of the bowels comes on; most commonly in those whose intestinal canal is easily deranged. Frequently there is brief, brisk action; but at other times the discharge persists. This, like the catarrh remaining after the removal of offending matter, requires treatment. A dose of opium is often all that is required. At other times the action of opium is not sufficient alone; and then the favourite adjuncts are either alkalies or astringents. Where there is a condition of

follicular ulceration of the bowels, and each motion is preceded by severe griping pains, ceasing with the evacuation of the acrid and offensive matter, then the old-fashioned remedy:—

℞ Cret. Prep. gr. xv.
Tinct. Catechu, ℥ss.
Tinct. Opii, ♏x.
Aq. Cinnamomi, ʒi.

after each motion is to be chosen, with a reduction of the dose for children; or some similar alkaline mixture with astringents may be given. When the motions are loose and copious the union of opium with acids and astringents is to be preferred.

℞ Tinct. Opii, ♏x.
Ac. Sulph. Dil. ♏xx.
Inf. Hæmatoxyli, ʒi.

four or six times a day is an excellent remedy, especially when diarrhœa has been persistent and profuse. Hæmatoxylin is a capital astringent and easily taken; but it possesses the drawback of being a decided dye. Nevertheless, when diarrhœa has run on some time it forms the best remedy to select, especially when others have failed. Some medical men prefer pills of acetate of lead and opium, which form undoubtedly a powerful astringent measure. It is much more convenient, and rational, to use sulphate of copper than acetate of lead. The copper does not interfere with the co-administration of acid astringent mixtures. Whatever the form of astringent selected, enemata of starch and opium are often very useful and grateful to the patient. Especially is this the case where there is follicular ulceration. Sometimes a little prepared chalk may be added to the enema with advantage. The food should consist of milk with ground rice, sago, or arrowroot in these cases; and all food which might give rise to irritation should be carefully avoided.

Often in addition to the mixture given, a powder at bed-time is serviceable. This may consist of compound kino powder (gr. x.), with or without ten grains of bismuth. Bismuth is as useful in the treatment of intestinal disturbance as it is in

gastric affections. In some cases of persistent looseness of the bowels, scarcely amounting to diarrhœa, bismuth with myrrh may be given with much benefit. Ipecacuanha is a remedy of whose value we are all convinced. In dysentery it is found that ipecacuanha in drachm doses produces a totally different condition of the intestinal canal to that previously existing; a normal motion, free from patches of morbid mucous membrane, taking the place of the dysenteric discharges, in twenty-four hours usually. Rutherford thinks this may be due to the effects of ipecacuanha on the biliary secretion.

Nervous diarrhœa is a variety with which we are all more or less familiar; an uncontrollable action of the bowels is an outcome of mortal terror in animals as well as in man. Increased secretion and activity in the intestinal canal is with many persons the consequence of mental perturbation; in such persons diarrhœa takes the place of the palpitation experienced by others when under mental agitation. Thus with many individuals the necessity for a long journey will excite diarrhœa. This has become more markedly the case since the introduction of railways with express trains only stopping at distant intervals; and then making so brief a stoppage as scarcely to afford an opportunity to empty the bowels. In some persons the very idea of such a journey will excite diarrhœa even before the journey is commenced, so that railway travelling is abandoned. In less marked cases there is always diarrhœa as the hour of starting approaches, and some brandy and hot water with a dose of laudanum have to be taken; and repeated pulls at a flask are requisite during the course of the journey. In such persons a preventive plan may be put in force with advantage. The day before travelling the bowels may be well opened with rhubarb, and at bed-time a dose of opium with some myrrh or bismuth may be given, or a few grains of compound soap pill may be taken instead. The diet should consist of milk and farinaceous foods, or maccaroni *au gratin*, for those with whom cheese agrees. In such persons the combination of bromide of potassium with some vegetable tonic or chalybeate is a good measure, and might be taken for some time ere commencing to travel, or during a course of travel.

At times diarrhœa is the reflex consequence of irritation,

under which circumstances it is to be treated by the means laid down before as best adapted to the arrest of reflex action.

In other cases diarrhœa is the consequence of congestion or obstruction in the portal circulation. It may arise from the obstruction offered by cirrhosis of the liver, with consequent ascites; or it may take its origin in general venous fulness, the result of obstruction to the blood-flow through the right heart. In the first case the substance of the liver is bound down and compressed by contracting bands of connective tissue, and the circulation obstructed, which forms a chronic obstacle; while a passing phlebitis in the portal veins causes a sudden increased obstruction. Here the venules of the intestinal canal are turgid and full, and a serous fluid drains away from the mucous surface of the bowels. Very commonly at the same time there is an accumulation of fluid in the peritoneum, from a like condition of the venules of the peritoneum. The diarrhœa which shows itself under these circumstances is a natural discharge affording relief; and instead of attempting to check it, it must be encouraged; and in some cases it may be desirable even to increase it by the administration of cathartics. The same rules apply to congestion of the portal circulation from heart disease. In both these conditions, indeed, it is our common practice to institute artificially a brisk action of the bowels where it is not set up naturally. With many people, and especially those who have not made much progress in matters medical, every discharge is a disease to be dealt with; just as they insist that if the bowels do not act purgatives must be administered, even if there be ileus. As purgatives do harm in the latter case, so will astringents be simply injurious in many forms of diarrhœa. Little can be done to relieve diarrhœa arising from the effect of a diseased liver upon the portal circulation; but when the congestion is due to heart failure, much may often be achieved by the administration of digitalis and iron, so as to improve the circulation generally.

It is said by writers that the diarrhœa of trichinosis should be encouraged by purgatives rather than arrested. There are still several forms of diarrhœa to be considered; these are tubercular, typhoid, uræmic, and colliquative diarrhœa.

In tubercular ulceration of the intestines diarrhœa often

occurs. It is obstinate and intractable. Of course there is no chance of removing the cause here, and all that may be done is to give relief by opiates, combined with fixed alkalies and bismuth. Milk diet with farinaceous food should form the chief sustenance.

The diarrhœa of typhoid fever is not to be rashly interfered with. In ordinary cases where it is not excessive it is best to let it alone. If blood be passed in the stools, or the discharges become numerous in the twenty-four hours, then astringents, with some opium, may be given with advantage. Sulphuric acid, with opium, is a favourite form with some; the lead and opium pill with others; while cold is approved by all. There is little to choose in such cases, and the discretion with which the remedies are wielded is probably a much more important matter than the mere form of the drug. When there is a typhoid condition coming on in the course of any sustained pyrexia, then diarrhœa must be watched rather than interfered with. When slight, it may be encouraged; when excessive, it may require astringents, of which chalybeates are the safest.

In diarrhœa of this kind, a form commonly found in persons advanced in years as a recurrent ailment, it is desirable to excite free perspiration by the use of the bath; to apply large hot poultices faced with mustard to the loins, or even to cup. When the skin is well roused and the action of the kidneys is restored, then some astringent, especially an astringent form of iron, may be given. There is always a lurking danger that opium and vegetable astringents might arrest the newly-restored action of the kidney, and the *nimia diligentia* be unfortunate. Better far is it to allow the diarrhœa to persist, than to be led to kill the patient in attempting to cure the ailment. When the action of the kidneys is once well re-established the diarrhœa will commonly die out of itself; if not, careful dietary and the pernitrate of iron will usually finish it off.

In that form of diarrhœa known as colliquative, where there is rapid emaciation, and where of old it was said that the solids of the body were melting away into liquids and taking the forms of diarrhœa, or in other cases of colliquative sweats, it is necessary to take measures as active, as in other forms of diarrhœa the measures are to be expectant. In colliquative

diarrhœa the patient will soon become exhausted if the discharge be not arrested. Here opium must be given with astringents, as sulphuric acid and cinchona-bark—or opium, hæmatoxylin and carbonate of ammonium, together with wine, æther, beef-tea, milk, and, indeed, everything calculated to sustain the patient. Sometimes it becomes a neck or nothing race, and heroic stimulation may afford the only chance of averting death.

Wood and Comegys describe a variety of diarrhœa due entirely to a very high surrounding temperature. Summer diarrhœa is, according to them, often really thermic, or heat diarrhœa. In such cases while the purging persists the temperature keeps high. Drugs fail to give relief; but the application of external cold, so as to lower the temperature, is effective and curative. Enforced cold bathing every three or four hours is the best antipyretic measure. The sudden sweet sleep, replacing, after the bath, the fretful nights and days of unrest, is a thing never to be forgotten when once seen, and the arrest of the diarrhœa is certainly no less remarkable. When the thermometer records a temperature running up from 101° to 104° Fahr. in infantile diarrhœa in hot weather, then antipyretic measures are to be adopted; either alone or in conjunction with astringents, especially the mineral acids. It is easy to distinguish thermic diarrhœa from other forms by the thermometer. Purgation lowers the body temperature as a rule, and in other forms of diarrhœa the tendency is to a low and not to a high temperature. In warm climates children are liable in hot weather to a form of diarrhœa known as "white scour," where there is an absence of bile in the intestines. Here a few grains of calomel night and morning soon affords relief, the bile reappearing in the stools.

§ 170. It now remains to consider the question of inflammatory conditions of the gastro-intestinal canal. Those of the mucous surface are pretty well included in the consideration of diarrhœa, except that of proctitis, or inflammation of the mucous membrane of the rectum. Here in consequence of the exquisite tenderness of the parts all expulsive action is reflexly arrested whenever set up; and enemata must be resorted to in order to liquefy the contents of the bowel and to permit of

their escape. After that the form of diet so often insisted upon in this chapter must be resorted to, with frequent enemata of bland and soothing character, and opium.

When there is inflammation of the serous covering of the bowels, the bowel must be kept empty—that is, have physiological rest—and be kept quiet by opium. Not only do we wish here to call out the general analgesic effect of opium and its sedative action; but also to secure its localized effect upon the intestines. It deadens sensibility as well as sensation; it keeps the inflamed parts at rest, and so diminishes their friction upon each other, thus limiting the necessity for effusions to separate the inflamed surfaces, or of bands of lymph to glue them together; while it soothes the system generally. No wonder then is it that in inflammation of the abdominal and pelvic viscera experience has decided in favour of opium, given in full and repeated doses. In general inflammation of the peritoneum, visceral and parietal, to keep the patient on the verge of death by opium is often the only way to escape the fate which would otherwise lie before him. In the convalescence from any form of enteritis the greatest care in diet is to be maintained for some time, as the bowels remain sensitive and are easily disturbed. In piles it is well to keep the bowels regularly open, and after each motion to bathe the anus well with soap and water; next to apply some cold or even iced water, or astringent lotion (ointments are dirty here), and then return the mass. An astringent opium and gallic acid suppository may be used at bed-time.

In rectal hæmorrhage small doses (gr. xv.) of sulphate of magnesium with dilute sulphuric acid (℥xv.) in inf. cinchonæ (℥i.) three times every day are effective.

Dysentery is found under two totally different sets of circumstances. It may be malarial, or it may develop in camps from foul surroundings. In each the local treatment of the bowel is of value for relief as well as cure. While full doses of opium and ipecacuanha are to be given by the mouth, it is well to wash out the bowel with warm water enemata, and then to inject bismuth (℥ss.) and opium (2 grains), with powdered gum arabic ℥i. and water ℥ii. two or three times a day. The severe tormina and tenesmus can thus be relieved in a short time, and the patient is made much more comfortable.

CHAPTER XVII

THE URINARY SYSTEM

§ 171. In no part of this work do greater difficulties present themselves as to the drawing of the limits, than in this chapter. Anything like a complete sketch is simply out of the question; and consequently a brief review of the subject, as regards the principal indications for treatment, is all that can be essayed.

The chief matter of interest is the kidney and its function; the other ailments of the urinary system, however important surgically, are of comparative unimportance to the physician.

The function of the kidney as the chief means of removing nitrogenized waste; and the serious consequences of accumulation of such waste matters in the system, cause disease and disturbance in these important little organs to be matters of the deepest interest. The secretion of the kidney contains azotized waste, certain salts, especially potash, and water, together with numerous other matters in trivial quantities; while at other times it contains new and strange material which has been given medicinally. There are some points about the renal secretion which need special attention from the practitioner's point of view; and these are the origin of urea, and the relations of water excretion to the condition of the circulation.

To take urea first is the best method. Urea is said in the older text-books to be the result of tissue metamorphosis, and it is asserted that the earlier products of histolysis, as creatine, creatinine and tyrosine, are changed in the kidney into the more advanced substances, uric acid and urea. The presence of urea and uric acid in the blood and tissues was accounted for by the hypothesis of re-absorption from the kidneys. Then it was

found that urea was largely manufactured in the liver, by the breaking up of albuminous matters into glycogen and nitrogenized waste. Now we know that urea is largely derived from this splitting up of albuminous material in the liver, as well as its formation from disintegrating tissues. It is the form in which by far the greater part of the nitrogen is discharged from the body. "Its amount is as important a measure of proteid metabolism as the quantity of carbonic acid given out by the lungs is of the oxidation of carbonaceous material" (Stewart's *Physiology*). This knowledge has borne fruit practically in directing the dietary of persons suffering from renal inadequacy. It has enabled us to relieve impaired kidneys by diminishing the amount of work they have to do. It is of the greatest importance that clear ideas should exist on this head. A large amount of the nitrogenized food we take is unnecessary, and is not required for tissue building: a comparatively small amount only of nitrogenized matter daily is sufficient for that purpose. We take it because we like this form of food; and because the stimulating properties of nitrogenized substances render them agreeable. The energy of the meat-fed man as compared with the vegetable eater is distinct and marked; but gout and other troubles are the inseparable alloy. There is a Nemesis behind the force-manifesting animal food. Lithiasis in its Protean forms may be successfully cultivated; and though gout may be more readily induced in some persons than in others, it can be produced by persistent effort in all. The presence of large quantities of waste nitrogen in the blood maintains the kidneys in a state of high functional activity; and the hyperæmia of active function leads in time to the production of connective tissue in excess. Such is the origin of the majority of the cases of chronic renal disease; such indeed is the natural history of interstitial nephritis, of the contracting, granular, cirrhotic, or gouty kidney. Long before the disturbance of balance betwixt the waste to be excreted and the power of the eliminating organs to excrete it, is forced upon the attention; a silent, gradual process has been in action, slowly but steadily destroying the kidney, and rendering it less and less equal to the duties demanded of it. It is only when some of the evidences of imperfect depuration

of the blood become manifest that we rouse up to the consciousness that the kidneys are no longer in their structural integrity; and that a slow and insidious form of disease has been stealthily undermining them. Further, too, we must clearly recognize the fact that the excess of duty thrown upon the kidney—the direct cause of the tissue changes in it—is the result of indulgence in nitrogenized food beyond the absolute needs of tissue repair. About this there should be no doubt—no haziness of opinion.

§ 172. The excretion of water by the kidneys is a subject on which it is desirable that a more distinct knowledge should exist than generally obtains. It varies very much with the condition of the circulation. If a large bulk of fluids be swallowed, rapid dialysis increases the volume of blood generally; there is greater pressure within the arteries, and a rapid secretion of pale-coloured urine follows. If it be summer, or, from any other cause, the skin is acting freely, the accession of water to the blood finds its way off by the perspiration; and the bulk of urine is but little affected. When, however, the skin is not so active, then the imbibition of fluids results in free secretion of water by the kidneys; by which means the bulk of the blood is maintained at a normal point. When the blood-pressure is increased, as in hysterical attacks with contracted arterioles, and in the middle stages of Bright's disease, there is a free secretion of water: when the blood-pressure is lowered, as in disease of the heart, the secretion is lessened; the gradually diminishing bulk of urine in a case of disease of the heart is a symptom of the worst omen. The relation of water excretion by the kidney to the condition of the vascular system is a subject too little insisted upon, though its practical value clinically is almost inestimable; it throws a flood of light frequently upon the course of a disease; while it not rarely furnishes the most pregnant suggestions for the line of therapeusis to be adopted. The arrangement of the blood-vessels in the kidney is very interesting. It would be difficult to conceive a disposition of parts more calculated to favour the escape of water from the blood than that of the Malpighian body. A large artery breaks up in a very direct manner into a number of minute branches, each of which suddenly opens into an

assemblage of vessels of far greater aggregate capacity than itself, and from which there is but one narrow exit. Hence must arise a very abrupt retardation in the velocity of the current of blood. There is indeed rather an exosmotic than a vital action going on in the Malpighian tuft, and the flow of water through the thin-walled glomeruli is almost a question of hydraulics—the greater the pressure on one side the more rapid the flow; the lower the pressure, the slower; but if the pressure on both sides be equal, as when the flow of urine through the kidney is arrested by a calculus in the ureter, then the flow ceases, and there is a standstill of excretion.

The secretion of water and the excretion of renal solids have, speaking broadly, nothing whatever to do with each other; the urine may be scanty, and of high specific gravity, laden with solids indeed; while at other times the flow is profuse, but the specific gravity is low and the urine is almost colourless, is indeed nearly pure water. As a matter of fact more solids are often eliminated when the bulk of urine is small than when the flow is profuse in the subjects of chronic renal disease; where these variations in the urine are common, and so decided as to compel the attention of the individual. The matter of water flow and the excretion of solids becomes a subject of the greatest importance in practice.

§ 173. *Diuretics.*—By diuretics we mean a class of agents which increase the flow of urine. From what has just been said it will be obvious that diuretics are to be classed under two divisions. (1) Those which act upon the vascular system, and (2) those which act upon the kidney. Those of the first division are sometimes entitled hydrogogue diuretics. This division includes digitalis, strophanthus, squill, and broom. These are the diuretics we resort to in dropsy, when the vascular tension is low. They are diuretics by their action upon the circulation generally; rather than by their action upon the kidney or the renal circulation. They increase the force of the ventricular contractions, while they tighten the arterioles by diminishing their lumen, and so they increase arterial tension; while the increase in the pressure within the arteries produces more rapid exosmosis in the renal tufts, and an augmented flow of urine follows. This is the mechanism

of the improved flow of urine which follows the administration of a series of doses of digitalis in cardiac disease, as in mitral regurgitation for instance. Such are the means by which the bulk of urine is increased in certain morbid conditions. When given to a person in health, digitalis produces but little increased flow of urine; in toxic doses there is suppression of urine. There is no notable increase in the bulk of urine solids after the exhibition of digitalis: this agent is not a diuretic in that sense at all. It is often desirable to increase the secretion of urine solids at the same time that it is necessary to act upon the circulation; then digitalis may be given with some of the second division of diuretics. Consequently we can combine these agents, and the following is a very agreeable mixture.

Sp. Chloroformi, ℥xx.
Tinct. Digital. ℥x.
Inf. Buchu, ad ℥i.

The addition of potash, in the form of the citrate, to this mixture makes it a complete diuretic, combining the various forms of diuretics; especially when followed by a good drink of water. Such combination is indicated in suppressed gout with a feeble circulation.

By such a combination we get an improvement in the circulation, at the same time that we stimulate the functional activity of the kidney. Without the vascular diuretic the circulation would remain languid; this agent not only increases the exosmotic consequences of heightened blood-pressure, but it improves the circulation generally, and, as part of it, the renal circulation. The buchu acts, it is held, upon the secreting cells of the uriniferous tubules, and increases the bulk of solids; while the potash dissolves the uric acid in the body, and as the soluble urate of potash, the uric acid finds a ready exit in the renal fluid. Such combination of diuretics is rational in theory and successful in practice.

The second division of diuretics is that of agents which act upon the renal circulation, dilating the renal vessels and so permitting of a free flow of blood, while stimulating the secreting cells. Juniper, buchu, cubebs, and turpentine are members of

this group of diuretics. But as some of the constituents of digitalis exert an effect on the renal circulation, so the ordinary preparations of these drugs contain some agent which acts upon the circulation. Gin contains alcohol, which stimulates the heart; juniper produces renal hyperæmia, increased functional activity, and larger volume of urine, with an augmented bulk of solids.

These diuretic agents seem to have a soothing effect upon the kidney, and to facilitate its working. Buchu, indeed, seems to possess similar properties over the urinary tract that bismuth has over the intestinal tract: though the action of each does not yet admit of an explanation. In conditions of vesical irritability its excellent effects are undisputed and indisputable. In conditions of excessive lithates and attacks of suppressed gout, all writers on therapeutics speak well of buchu. It may not be asserted positively, in the absence of direct observation, that buchu increases the solids in the urine, but the general impression produced by the use of buchu is pretty distinct, that the cases so treated do better than when the buchu is withheld. In actual practice buchu is almost invariably the vehicle in which other diuretic agents are given. It certainly is agreeable to take, it is well borne, and its volatile oil is readily found in the urine; showing the probability at least of its having some local action upon the kidney. Citrate of potassium and buchu form a pleasant mixture in lithiasis, gently acting on the kidneys after an attack of acute nephritis, and washing out the blocked tubules. This Dickinson maintains is the correct treatment of tubular nephritis, when the acute stage is over. With iodide of potassium (five grains), bicarbonate of potassium (five grains), and ten drops of colchicum wine, an ounce of infusion of buchu forms an excellent remedial measure in suppressed gout or lithiasis, especially when followed by a draught of water. Here we require a combination of diuretics suited to the patient's needs, and forming a complete contrast with what is required in heart failure. In lithæmia there is commonly a large flow of urine pale and of low specific gravity; here we wish to increase the bulk of urine solids; in heart failure the urine is high-coloured, dense, and laden with solids; here we wish to augment the bulk of urine. According to the circumstances of

each case do we select our diuretic. A brief consideration of the physiology of the renal secretion will tell us that digitalis is unsuited to lithæmia, that is in the earlier stages before the hypertrophied heart begins to undergo fatty degeneration; and that potash and buchu are equally unsuited to relieve cardiac debility. In cases where both exist together a combination of the remedies may be indicated. It is abundantly clear that it is not a matter of indifference what agent, classed as a diuretic, we select in our treatment of a case, nor yet what combination even we choose. Certain members of this group are suited to certain necessities, and others to other needs. For successful practice it is necessary to know when to prefer squill to juniper, and broom to buchu. Unless the reader makes himself perfectly familiar with the different actions of vascular and simple diuretics, he will often blunder in his selection of remedies; and fail in giving relief in a very large and important class of cases. He may by accident hit upon a successful combination by putting several diuretic agents into one mixture—a sort of practice which has no doubt often been followed by excellent results; but he will find a distinct and clear comprehension of the action of each agent a much better and surer plan; both for the patient's and his own interests. A diuretic which acts upon the circulation may often be added to diuretics which act upon the kidney itself with good effects; and such combination is easy if what has been written above is not only read but inwardly digested. For renal ailments form a large part of the diseases and troubles of the wealthy and the influential, as well as of the indigent; and the lessons learnt from the treatment of the one may be made very useful in the relief of the other. There is no surer nor more deserving road to success in practice than a sound knowledge of those ailments with which the various classes of diuretics are associated; and the man who knows when a vascular diuretic is to be preferred to one of the other class, has a decided advantage over the man that does not.

Citrate of caffeine is now largely used as a diuretic. Dr. John V. Shoemaker, in the third edition of his well-known *Materia Medica*, points out that the excretion of urine is at first increased and afterwards diminished. When administered in medicinal doses he finds that the blood-pressure is lowered.

The cerebral functions are stimulated, so that in some people wakefulness results. He speaks well of the following formula:—

Caffeinæ Citrat. gr. xlv.
Liquor Potassii Citrat. ℥ v.
Spiritus Ætheris Nitros. ℥ v.
Infus. Digitalis, ad ℥ii.
Half a teaspoonful in water every three or four hours.

In parenchymatous nephritis attended with dropsy he prefers this mixture:—

Caffeinæ Citrat. gr. xlv.
Tinct. Strophanthi, ♏lxx.
Aq. Camph. ad ℥iii.
A teaspoonful three times a day.

§ 174. Acute nephritis is an ailment which commonly results from exposure to cold, or other sudden arrest of the action of the skin. A little reflection will soon demonstrate how this comes about. In the involutions of the general external surface, as evolution proceeds, none retains so completely as the kidney the functions of the general excretory surface; consequently, when the action of the skin is arrested an extra demand upon the kidneys follows. The action of the skin in blood depuration is very considerable, and when this is lost we have great hyperæmia of the kidney with increased functional activity; which not rarely passes on into a true inflammatory condition. That there is another factor, in the general congestion of the internal organs, which occurs when the cutaneous vessels are contracted, must be admitted; as is also the case in pneumonia: but, nevertheless, the inflammations which most commonly result from cold are situated in those organs which have a similarity of function with the skin; and that this is an important matter cannot be doubted. When the kidneys are acutely congested or inflamed, their functional activity is so impaired that there is an accumulation of waste matter and of water in the system. The whole areolar tissue is not rarely filled with fluid, and there is general anasarca more or less pronounced. This accumulation of water furnishes the most

prominent symptom in the altered appearance of the individual; but the retention of the nitrogenized waste is the really serious matter. When the kidney mischief is due to scarlatina (where the relation of the skin and kidneys is well seen in the pathological process of inflammation and desquamation) convulsions of uræmic origin are common; and in all cases of nephritis they are liable to occur. At other times this azotized waste excites inflammation of serous membranes; which is very grave when the cerebro-spinal serous membranes are those chiefly implicated.

The indications for treatment in such conditions are to procure fair depuration of the blood by exciting the action of the skin and the intestines. The first may be attained by rolling the patient in blankets wrung out of hot water, or by Simpson's bath. This should be followed out vigorously; at the same time the bowels should be acted on briskly by forty-grain doses of compound jalap powder at repeated intervals; or five grains of gamboge in two drachms of bitartrate of potassium, the griping being ameliorated by ten grains of black pepper. The sweating and purging are followed by a sense of general relief, while the kidneys are specially relieved. By such plan not only are the inflamed kidneys eased by lessening the demand on them functionally, but the refilling of the cutaneous vessels lessens the blood-pressure in the arteries; while the purging relieves the venous congestion, and especially that of the portal circulation, and so the renal hyperæmia is reduced. Such vicarious action and effect upon the circulation combined must be maintained steadily, according to the needs of the case and the changes in the renal secretion. If the case be slight, the urine will be smoky, from the presence of colouring matter derived from the blood, and will be merely albuminous. If the case be severe, the urine will resemble blood. According to the appearance of the urine will be the activity of the remedial measures: in some cases gentle measures, in other cases heroic ones are to be adopted.

This relief of the kidney by acting upon the skin and bowels is self-evidently the plan to be pursued in acute nephritis; and about its propriety there exists no doubt. There is some difference of opinion about the use of diuretics during the inflammatory process. Many excellent authorities are in favour of

the administration of potash in acute nephritis; the purgatives in most favour contain potash, and not only that, but it is found that citrate of potash is useful in addition to the cathartic measures. It forms a pleasant beverage, very grateful to the thirsty feverish patient, and seems to exercise a beneficial effect over the progress of the malady. In a disease which tends to spontaneous recovery under simple hygienic and prophylactic treatment, it is necessarily a matter of extreme difficulty to bring home the evidence of the curative power of drugs; but in a considerable number of cases of acute Bright's disease coming under treatment early, the best results almost invariably are obtained by the free administration of citrate of potassium. And in no instance where the urine has been rendered alkaline in the first week of the complaint have the more severe uræmic symptoms, or secondary inflammations, been observed.

Such are the remedial measures which call for our confidence in acute nephritis; while the dietetic measures are to give milk and seltzer-water, lemonade, thin fluid preparations of farinaceous foods, and other forms of food and drink which shall not contain nitrogen; duly bearing in mind the function of the kidney, and the chief danger surrounding the patient.

§ 175. Albuminuria is an indication of renal disturbance well deserving of our attention; the more so that its real significance is far from being clear. The urine may be laden with albumin in cases where no symptoms of ill-health are present, and where the morbid state of the urine passes away without any illness on the part of the individual; while on the other hand Grainger Stewart writes: "Albumin is rarely present in any considerable quantity, and its presence—fitful in its appearance, and varying in its amount—is also difficult of explanation," in cirrhosis of the kidney; which, he says, "is the most hopeless of all forms of Bright's disease in relation to treatment." Certainly the amount of albumin in the urine is no measure of the amount of renal mischief; and very often its appearance gives no occasion for alarm, and its absence in other cases confers no comfort. The simplicity of testing the urine for albumin, and so settling the question of the presence or absence of kidney disease, is so alluring, that many forget that it is only one symptom of

renal disease; and that, too, a symptom about whose value there is the greatest variety of opinion. It is not certain whether albumin is not normally present in the fluid which drains into the uriniferous tubules, and is absorbed by the epithelial cells which line these tubes, or not; indeed the subject is shrouded in mystery. And yet there are many who would base their diagnosis as to one of the most complex matters in all medicine, on the physical characters of the urine. The question as to whether a young man who suffers from "physiological albuminuria" should be accepted for life insurance at the ordinary rates, is one which has been much discussed. Some authorities hold that he should be taken if it were clearly shown that the urine contained albumin only occasionally, and that in the forenoon, whilst others have expressed a decided opinion that temporary albuminuria, even when traceable to food, or over exertion, or exposure to cold, will sooner or later lead to persistent albuminuria, and to future disease of the kidneys. The diagnosis of chronic renal disease during its quiescent periods (that is during the greater portion of its existence) is a matter involving much thought and care; much knowledge and observation, watchful attention, and thoughtful pathological research, ere an opinion entitled to any weight can be reached; and yet there are those who will at once decide the matter by testing the urine for albumin, and if it be not present throw over forthwith all the other evidences—a plan calling for stern reprobation.

Albuminuria is a valuable symptom when carefully appraised; but it will not settle the question of renal disease. It is a symptom not to be neglected, but it has been sorely abused; it has covered much culpable carelessness, and occasioned much mischief. The man who would make the diagnosis of chronic renal disease turn on the presence or absence of albumin, is a man who certainly has not availed himself of his opportunities of acquiring a good knowledge of physiology. The silent progress of interstitial nephritis is often without albuminuria for long periods; the absence of albumin, therefore, does not contra-indicate the presence of disease, even when far advanced; at other times albuminuria is a temporary condition of no real importance. Albuminuria derives its significance from the

conditions under which it occurs; and the great matter is to arrive at a knowledge of these conditions; after which only can we appraise the value of this symptom. This view of the matter is too little insisted upon, even by those who know well the value of the testimony furnished by albuminuria.

If its diagnostic import is surrounded by difficulties, the treatment of albuminuria is no simpler matter. That the loss of albumin may impoverish the blood, if excessive, must be admitted; but the means of restraining its loss are far from deserving of confidence. It was once thought that astringents, as gallic acid, tannin, the astringent preparations of iron, and other metals, did good in checking the drain of albumin. Now much scepticism prevails as to the utility of astringents. More confidence is felt in feeding the patient and meeting the drain by quantities of albuminous food, and yet there are objections to this plan; for in the splitting up of albuminous bodies in the liver much nitrogenized waste is produced, which is a matter to be avoided. In obstinate cases of albuminuria hot baths often produce more effect than anything else; while cod-liver oil is useful in improving the anæmia. The effect of opium in checking the flow of urine would indicate its use; were it not that albuminuria is often associated with uræmia, and there opium is strongly contra-indicated. Warm clothing, promoting cutaneous vascularity and functional activity, occasionally purgation with cathartics containing potash, a plaster over the loins, or frequent applications of hot poultices faced with mustard, or perhaps dry cupping; and potash, the tartrate of iron in buchu; together with a restricted diet, chiefly of farinaceous, fatty, or fish food, are the remedial measures to be generally adopted. When the albuminuria follows scarlatina, careful protection of the skin is of the utmost importance, especially in cold weather. In all cases the use of the cumberbund, or waist-belt, is to be recommended. If albuminuria persist, and there are other evidences of renal disease, the patient should seek a warm climate; and even then be warmly clad. Albuminuria is associated with anæmia, and in anæmic persons there is little resistive or reparative power; consequently colds should be carefully guarded against. The feet should be kept well protected. If the bowels require to be

regulated, something like the following mixture might be given:—

Ferri. Sulph. gr. xv.
Mag. Sulph. ℥ii.
Pot. Bicarb. ℥iii.
Inf. Buchu, ad ℥viii.

a tablespoonful once or twice a day in a tumblerful of water as required; or some of the chalybeate saline waters may be given instead.

Hæmatics must be combined according to the necessities of each case; and in the anæmia of imperfectly depurated blood, potash and purgatives are as valuable as iron. This much may be safely said about albuminuria, that its presence during the course of a chronic renal affection indicates the necessity for special care. It is not an outcome of the healthy portions of the kidney, ordinarily at least; neither is it the outcome of portions totally destroyed by interstitial growth of connective tissue: probably its presence indicates active change in some portion of kidney hitherto unaffected. Possibly at times it is an outcome of mere renal hyperæmia. It is questionable how far the drain of albumin is ever sufficiently serious to endanger life; and it is even more questionable if the drain can be checked by astringents, unless they be ferruginous.

§ 176. Bright's disease is a term used to designate a series of chronic changes in the kidney of the utmost importance in every way. It is very difficult to formulate a satisfactory definition of Bright's disease. "It should not include temporary symptomatic albuminuria such as accompanies the venous congestion of heart disease, or the secondary albuminuria of cholera, or the febrile albuminuria of erysipelas, diphtheria, or typhus. It should not include any case in which transitory albuminuria occurs without there being reason to suppose any organic change in the kidneys. And lastly, it should not include cases in which the presence of albumin is only due to that of blood, of pus, or of hæmoglobin." (Hilton Fagge.) Taking into account these various reservations, it may be said that by Bright's disease we mean primary diffused nephritis attended with persistent albuminuria. Three very marked

forms of morbid changes are found in the kidney, viz. in the tubules; in the blood-vessels; and in the connective tissue. It is a disputed point whether either of the first forms ever exists long without the connective tissue being increased. The purest and most chronic form of disease is interstitial nephritis. It is the excessive development of connective tissue, or basement membrane, which so commonly follows high functional activity, with hyperæmia of an organ. The other morbid changes are usually of briefer duration; the tubular form of the disease not rarely ending in recovery. When the vessels are affected in that form of renal disease termed amyloid, it is questionable if anything more than palliative measures are ever attainable. At other times the chronic changes take the form of fatty growth—not fatty degeneration, but interstitial growth of fat. This change gives but few indications of its existence. When the chronic changes are somewhat accelerated in certain constitutions, there is fatty degeneration of the albuminous casts; a symptom of evil omen. But whatever the form of change, the great principles of treatment are the same in each case—modified by individual necessities according to the judgment of the practitioner.

The ophthalmoscope often gives valuable information in cases of Bright's disease. In the case of women it is sometimes more convenient to make this examination than to obtain a specimen of the urine—at all events at a first visit. In albuminuric retinitis, whitish spots are often seen close to the optic disc, due in all probability to degenerative change in the nerve fibres. Associated with them are not uncommonly retinal hæmorrhages ranging much in size. Optic neuritis may be the most conspicuous retinal change.

Ere proceeding to the consideration of the treatment of chronic renal changes, it may be as well to review briefly the causation of the changes; as that will be found to furnish useful indications for the prevention of such changes, and the slowing of the morbid action when established. The first great point is that chronic renal diseases are commonly the outcome of indulgence in a highly nitrogenized diet; excessive functional activity leading in time to structural changes. Then the second great cause is exposure to cold and especially

changes of temperature. The function of the skin is closely allied to that of the kidney; not only as regards water elimination, but also as regards the excretion of nitrogenized waste. Repeated chills to the skin not only produce renal hyperæmia by the internal congestion which follows all contraction of the cutaneous vessels; but by the action of the skin being checked there is an accumulation of waste in the blood, and then there is furnished another cause of renal hyperæmia and increased functional activity—the two chief factors in the induction of interstitial changes. Careful thought over the relations of the skin and kidneys will not only explain the association of acute nephritis with sudden exposure; but will also elucidate the connection which exists betwixt constant exposure and chronic renal changes: and illustrate an important part of the treatment of this affection.

Not only so, but the question may be raised as to how far the renal changes are involved in general conditions, and are modified by the general conditions. The gouty form of Bright's disease with florid complexion so common in England, is much rarer in Germany, where there is a marked tendency towards anæmia and œdema; and yet interstitial nephritis is the form of renal change in both cases. The tendency of present thought is too much towards making the kidney the starting-point of all the changes found in chronic Bright's disease; and consequently of finding different sequelæ, requiring various treatment according to the form of renal disease. Not that this is not good and proper, if kept within certain and safe limits; but it may be overdone. The very form assumed by the changes in the kidney depends to some extent upon the age, sex, and diathesis of the individual in whom they exist; and the treatment will be modified by such concurrent circumstances in each case. Then again the renal disease may be but part of a general break up of the system. A certain number of cases of chronic Bright's disease present themselves, in which the most searching analysis fails to indicate the exciting cause of the disease. In some of these the renal affection is only a part manifestation of some widespread cachexy, in which fatty degeneration co-existed in the heart, great vessels, brain, and kidneys. In this last series of cases little can be done, and that

little is only palliative. In other cases again, more especially of the more acute forms and in young subjects, the starting-point is clearly and distinctly in the kidneys; and if the measures taken are judicious and carried out firmly, much good may be done; indeed, an entire cure may be effected. What those measures are we shall see immediately. In order to comprehend renal disease clearly we must remember that chronic Bright's disease, in the great majority of instances, begins slowly and imperceptibly. It is rarely detected until it has existed many months—it may be years. The attention of the patient is awakened by the general failure of his strength, the increasing pallor or sallowness of his complexion, and his disinclination to exertion; perhaps his suspicions are aroused by a little puffiness under the eyes—"the Bright eye"—a slight swelling of the ankles at night, unusually frequent calls to void urine, or shortness of breath. In other cases these premonitions are altogether wanting, or perhaps they pass unheeded. The fatal disorganization of the kidneys proceeds silently, amid apparent health; and then suddenly declares itself by a fit of convulsions, rapid coma, amaurosis, pulmonary œdema, or a violent inflammation. Perhaps the disease creeps on stealthily in the wake of some pre-existing chronic disorder—phthisis, caries, necrosis, joint disease, constitutional syphilis, chronic alcoholism, or exhausting suppuration. Or it may be a continuation or sequela of acute Bright's disease. Lastly, the disease may lie concealed for an undetermined period, and then reveal itself after exposure to cold, or a fit of intoxication, in the guise of an acute attack—with rapid general anasarca and scanty albuminous urine. The change in granular kidney begins in disproportioned growth, somewhat of a rank luxuriance, in the fibroid tissue with which the arterial channels are uniformly fringed. Hypertrophy of this part leads to atrophy of all the rest. Creeping along the arterial lines with slow and hesitating steps, involving the organ not all at once, but by little and little, the disease makes itself felt not suddenly, but with so gradual a departure from health, that its date is usually undeterminable, and its existence unsuspected until it has reached an advanced stage. The importance of understanding the silent, unobserved course of the disease ere it

becomes apparent lies chiefly in the learning to distinguish and appreciate the indications of such changes in their earlier stages. This can only be acquired by the most careful and painstaking observations of all cases; a thorough investigation of the past history of the individual, and a minute registration of external changes, so that an acquaintance with the natural history of the disease may be attained. Having so learnt to form a "presumptive diagnosis," much may be done to prevent and arrest the morbid changes ere they have become undoubtedly established. It is in these earlier stages, of which there may be so few indications, at least of the certain signs and symptoms, that our measures will be most valuable and protective; and the power to recognize these earlier indications is only given to those who earnestly investigate and inquire. It is a matter of much moment both to patient and practitioner that such knowledge exist, for then measures may be taken to avoid irremediable changes.

§ 177. Whenever there exists a suspicion of renal disease, the patient must be watched carefully for the less doubtful indications, which may be long in showing themselves; all the longer, indeed, if the treatment be justly and truly adapted to the case. It is not only the avoidance, as far as may be, of any aggravation of the already existing disease that is to be aimed at; it is the avoidance of any acute condition that we must strive against. In these acute conditions lie most of the danger to life. Wherever chronic disease pre-exists, there acute disease is most formidable. In the phthisical, acute pneumonia is ever to be dreaded; the old-standing mischief is lighted up, as a fire, by the acute intercurrent disease. In chronic debility of the stomach acute indigestion quickly sets up grave disorder. In chronic disease of the liver acute hepatitis becomes most serious. And so in chronic renal disease the great matter to be avoided is those conditions of acute congestion, or even of nephritis, which are so apt to occur in the subjects of chronic renal changes; and to which pre-existing disease renders them so liable. The means to be adopted lie largely in the connections with the skin and with the diet.

It is of much importance to keep the skin warm; both from the effects of cold in producing internal congestion, and from

the aid given to the kidneys by the functional activity of the skin. The subject of Bright's disease should always be warmly clad. The tendency of this malady is to produce a dry and imperspirable skin; so that the impaired kidneys get little assistance from cutaneous activity. The hypodermic administration of pilocarpine is by many authorities considered to exert a beneficial action. In many cases of gout, and the other outcomes of lithiasis, in cold weather it may be made a matter of question how far the skin may not be the exciting cause of the outbreak, rather than the kidneys. From the large amount of oxygen respired in low temperatures more perfect oxidation goes on, and yet there is a large quantity of unoxidized waste in the system. There ought to be greater freedom from these manifestations of imperfect blood-depuration, and yet the opposite is often the case. Some gouty persons—using the term gout in its widest sense—are best in cold weather; while others again are best in warm weather. It is impossible to put away a conviction that the difference in these cases lies in the action of the skin *versus* more complete oxidation. At any rate it is of the greatest importance that the skin be well covered. Flannel from the neck to the wrists and ankles, or even "fleecy hosiery," must be worn in the day-time; and flannel night-dresses must be used for bed wear. Changes of temperature must be as carefully followed as in India, where it is necessary at some seasons to dress three or more times a day—for the cool morning, the hot noon, and the chill evening. The shoes and boots must be stout and well-lined, and contain an inner sole of cork, felt, or even fur. About the importance of stout shoes it is impossible to be too explicit. All exposure to wet must be followed by a change of boots, even when it is in no way necessary to change the clothes; but all damp clothes should be changed without delay. The subjects of chronic Bright's disease live as it were over a volcano: and the slightest carelessness may be followed by the most grave consequences; what would but produce a mere cold in others may induce a fatal attack of intercurrent inflammation in them. Not only that, but there is the danger of producing further destruction of those parts of the kidneys remaining sound, by each repeated attack of congestion; it is the silent, gradual destruction of the

kidneys that is to be feared, as well as the general inflammatory attacks of various organs which immediately endanger life.

The prognosis in this complaint is not very favourable, and many people go so far as to say that the prospects of a patient suffering from confirmed chronic Bright's disease are exceedingly gloomy. The textural changes in the kidneys are of a kind that do not admit of reparation. The Malpighian bodies become enveloped in an exudation of low plastic material, of which the only tendency is to progressive contraction, and the tubuli are either blocked up with fibrinous plugs or shrivelled into useless fibres. The gland, however, is not equally affected throughout all its parts, and the less injured portions carry on, imperfectly, the depurative functions. As the sounder portions become more and more involved, the work done by the kidneys grows less and less, and the blood is more and more contaminated with histolytic and urinous elements, until at length a limit is approached which is incompatible with life. Long before this extreme limit is reached, however, death is brought about in a large number of cases by one or other of the numerous complications to which the subjects of renal degeneration are obnoxious.

§ 178. At the risk of being charged with repetition, it is necessary to be explicit about the relations of the food we take to the function of the kidney. As the chief eliminators of azotized waste, it is obvious that when the kidneys are undergoing gradual destruction, it is necessary in order to maintain an equilibrium between the power of the organs and the work to be done by them, that the amount of nitrogenized food be reduced. As the renal disease progresses this must be done; else explosions of uræmia will be induced from time to time, which may act as temporary auxiliaries in blood-depuration, but which will distinctly endanger existence. Not only is there danger from the accumulation of nitrogenized waste, when the waste matter is too much for the excretory power of the kidney; but the hyperæmia which goes along with excessive functional activity in the renal organs may proceed to acute congestion, or even inflammation, in those parts remaining sound; and so the destructive process be accelerated. The amount of nitrogenized food must be gradually reduced in proportion to the diminishing

structural integrity and functional power of the kidneys. If this be not done further mischief will result. It has been shown that the great bulk of nitrogenized waste comes from the splitting up of albuminoids in the liver, and the production of glycogen. Small quantities only of nitrogenized matter are required for mere tissue repair—for the absolute needs of the system. For the formation of glycogen farinaceous foods will do equally well. The only difference is that the excess of nitrogen acts as a stimulant to the nervous system, and gives a sense of energy: this, however, is a small matter, comparatively, but as many persons object very decidedly to any diminution in their sense of energy, they oppose the proper treatment and speak of it as too lowering. This is deep-rooted fallacy, which often calls for very firm and decided opposition. The patient is incapable of having any explanation given him in consequence of his ignorance of physiology, and must rest satisfied, or unsatisfied, with dogmatic statements;—while he remains distinctly conscious of the loss of energy. But, nevertheless, the plan must be insisted upon in his own interests—*i. e.* if he wishes to preserve his life. The diet should consist largely of farinaceous matters, fish, vegetables, and fruit. Small quantities of lean meat alone may be safely adventured; and beef-tea and soups must be indulged in in very moderate quantities, the more so that their nitrogenized matter can do little but undergo retrograde changes. It is necessary to speak decidedly on this matter; beef-tea and the azotized matters of soups are rather stimulants than food, their quality as food ranks very low; they may form palatable adjuncts to boiled sago, arrowroot, and other farinæ, but they are otherwise of little use, and only embarrass the failing kidneys. At present beef-tea and Liebig's extract are the fashion, and it is almost heresy to have doubts about their unalloyed goodness; nevertheless, these doubts are well-founded. In fish we possess a form of animal food which is, or can be made, palatable, and satisfies the cravings of the appetite; and the sufferer from chronic Bright's disease can make a hearty meal of fish, with melted butter or sauce, without overtaxing the kidneys. Fish then should form a large portion of their dietary. Farinaceous foods and puddings, or blancmange, will make with fish a satis-

factory meal, especially if followed by salad and fruit. Such a meal will satisfy any but a gourmand. Doubtless it requires some ingenuity on the part of the caterer to prevent a certain amount of monotony in such a dietary; but it may be relieved by meats, which shall be taken sparingly, and be accompanied by much fat. It is not necessary to restrict the diet as regards articles, so much as to keep steadily to the principle that the food shall not be too highly nitrogenized. If this be adhered to, the dietary need never be felt to be too restricted.

In many persons who are stout, and who are also the subjects of chronic renal changes, the matter of diet becomes very complicated. If they consume hydrocarbons their obesity is increased; if they cut down their hydrocarbons in favour of albuminoids, then renal trouble is the consequence. For such persons a fish dietary with the more highly oxidixed hydrocarbons, such as rice, are admirably suited. They wish to have a certain bulk of food in order to satisfy their cravings; and in these forms of foods, together with many vegetables, they may find what they seek. When, on the other hand, renal changes are complicated with glycosuria, then the farinaceæ must be avoided, and the more concentrated hydrocarbons must be taken instead, together with bran biscuits, &c., and vegetables. Doubtless in some cases the absolutely correct diet is so limited in range that it is very difficult to adhere to it. Nevertheless it is the medical adviser's duty to put the matter plainly and clearly before each patient in every case, and to leave the responsibility of action with the person who is chiefly interested; urging, however, in season the adoption of the right dietary.

§ 179. The matter of drinks is not unimportant in the regulation of the dietetics of Bright's disease. It is well known that alcohol if taken in large quantities and undiluted, has a very pernicious action upon the kidneys; consequently, if alcohol be taken, it must be in a state of dilution. If taken as spirit, it must be taken with potash or seltzer water, Vichy, Vals, or St. Galmier water, and the water must be in good excess; anything like concentrated drinks are to be avoided. The amount of alcohol consumed daily should never be large, otherwise the interstitial changes in the kidney may be stimulated. When wines are taken it is a matter of importance to

choose the least deleterious forms. Sherry and Marsala, with plain claret, are the only wines at all safe. If a good Bordeaux, a rich Rhone or Rhine wine, port wine, champagne, or Moselle are indulged in, the consequences are very disagreeable; especially when there exists a tendency to the accumulation of uric, or the production of oxalic acid. In consequence of the tendency towards the formation of oxalates in the subjects of lithiasis, articles likely to furnish these materials must be avoided. The sensations of a gouty man next day, after being inveigled into the taking of rhubarb champagne, form a good test of the quality of the beverage. A plain wine with mineral waters is the safest drink. As to malt liquors, they are mostly to be avoided; there are, however, some pale ales which are very free from objectionable qualities. The lighter pale ales, of which there are many excellent forms to be procured, and the Bavarian beers, are free from, or nearly free from any objectionable properties. They may be taken in limited quantities without evil effects. But drinks should be taken in very limited quantities in those cases where the filling of the blood-vessels with fluid is undesirable, as in renal dropsy; while in other cases the washing of the tissues with water is eminently desirable. When there is some glycosuria, subacid fruits and alkaline waters are to be preferred; a limiting of the amount of fluid in these cases gives a counterbalancing relief from certain unpleasant sensations, and compensates for the self-denial exercised in resisting the temptation to indulge in fluids in inordinate quantities. A careful restriction in the matter of drinks as well as foods is desirable in the subjects of chronic renal changes.

§ 180. Having briefly gone over the proper clothing and dietary suited to these patients, something may now be said as to the indications for the remedial measures to be resorted to in cases of chronic renal disease. It is obvious that nothing can be done to restore the structural integrity of the kidneys; the more need then to conserve what is left of them. How to diminish the call upon them, and to prevent them from sudden derangements, has just been given. If there be albumin in the water, and it is smoky or blood-stained, together with aching in the loins and other evidences of renal congestion, hot poultices

to the loins, or dry cupping, hot baths, and alkaline purgatives are to be resorted to, just as in attacks of acute nephritis; indeed, there is no difference but that of degree, betwixt this condition and acute nephritis. All that has been insisted upon there is applicable here: it need not be repeated. Something, however, may be said about what is requisite more permanently in such cases, especially in the convalescents from acute attacks. It is desirable that they should take potash in its blandest and least irritant forms. It may be so combined with purgatives as to form a pleasant domestic remedy. When given with sulphate of magnesium and buchu it is eminently suitable for those cases of constipation which are accompanied by a dense mass of lithates in the urine. Whatever the form used, each dose should be washed down with a good draught of water. Where there is a tendency to anæmia this resort to potassic laxatives, freely diluted, should always precede the administration of chalybeates; and usually they should be given together afterwards. As convalescence proceeds the citrate of potassium may give way to a combination of the bicarbonate of potassium with the potassio-tartrate of iron, which must be continued some time: the amount of potash being diminished gradually, especially if mineral waters are also taken. One of the great points to be attended to in convalescence is to remember the function of the kidney, and to be very guarded in every step taken. The amount of nitrogenized food must be limited, iron must be accompanied by potash; the bowels must be kept open, and the action of the skin must be maintained, if dangers are to be avoided. When there are grounds for supposing that renal congestion is threatening, then quick resort to smart catharsis and the use of the hot bath will often avert the impending state of peril. It has been found that the condition of high arterial tension which precedes albuminuria in acute renal congestion, is relieved by brisk purgation and the use of the bath; so that the presence of albumin in the urine can often be prevented. It is probable that this vicarious depuration does away with the impending renal congestion, of which albuminuria is the external evidence.

In many cases of acute nephritis, and in cases of passing congestion in kidneys already structurally diseased, it is very

desirable to be slow and cautious during the convalescence: "the more haste the less speed" is here very applicable: when the case is doing well young practitioners in their anxiety are often wishful to accelerate the progess; but it is not always desirable to do so. Great caution and thoughtfulness are the chief matters, and should be assiduously practised.

Having thus sketched in outline the great principles of treatment to be adhered to in chronic renal ailments, the reader must fill in for himself the details for each case from his acquaintance with what has been written before; and his power to do so will form a good test of how far he has read attentively, and thought intelligently over the subject-matter; for it is one of those matters where no explanations, however lengthy and detailed, can do away with the necessity for individual thought.

§ 181. When interstitial nephritis is the consequence, as it not uncommonly is, of valvular disease of the heart, it is obvious that the only treatment of any service will be that which will relieve the venous congestion. Obstruction to the circulation in the portal veins produces an arrest of the circulation in the kidney; there is venous congestion and albuminuria, together with growth of connective tissue. At the same time the bulk of urine falls; and the gradual diminution in the bulk of urine with the appearance of albumin in the fluid, furnishes a sign of the worst omen in the course of heart disease. Brisk purgation and hot baths, so as to relieve the venous fulness, and agents which act directly upon the heart, are to be administered freely; so as to keep up the tone of the circulation and the fulness of the arteries. This last measure is of great utility in bringing the blood more steadily to the kidneys, and so of its being better depurated. The waste-laden condition of the blood in the more advanced stages of heart disease often leads to arteriole spasm, obstructed circulation, and ventricular failure—to those attacks, indeed, which are so dangerous and fatal in advancing cardiac decay. The condition of the heart leads to changes in the kidneys, and these, in their turn, obstruct the heart; and so the vicious circle widens. Renal disease is also a cause of changes in the heart.

§ 182. The other troubles of the urinary organs, not being renal, come but little within the province of the physician; they

lie rather in the domain of a surgeon. The most troublesome is incontinence of urine in children; and that is rather an affection of the nervous system. Whether there is nocturnal incontinence of urine in the child, or great vesical hyperæsthesia in the bladder in adults, especially in elderly men, it is equally desirable that there shall be no local causes of irritation. Fæces in the rectum or descending colon, ascarides, piles, fissures, &c., are all fertile causes of vesical irritability, and their removal is very necessary. In all cases the bowels should be emptied at bed-time—a measure often giving much relief. Local irritation in connection with the generative organs also should be avoided, any irritability or excitement in them induces vesical irritability—*Nec castus frequens mingit* is an old proverb which holds good yet of both sexes. For the allaying of vesical irritability a combination of bromide of potassium with hyoscyamus and camphor, at bed-time, forms a most excellent remedy. In addition to these measures alkaline purgatives are desirable, as well as the constant exhibition of potash, which relieves efficiently the irritant qualities of acid urine, in combination with buchu, triticum repens, pareira brava, and uva ursi. These two latter agents also contain tannin, which makes them specially useful in cases of catarrh of the bladder; where they may be given with advantage. When the urethra is affected alkalies are generally given, together with cubebs or copaiba; both of which are more or less given off in the renal secretion, and exercise a beneficial effect over the urethral tract.

In irritability of the bladder in catarrhal conditions the injection of opium or morphine with astringents is often good practice. Here, and in urethritis also, it is well to render the urine alkaline, and to give buchu with camphor and hyoscyamus. In the incontinence of urine in children, atropine, given in efficient doses, often procures satisfactory results.

Atropiæ Sulphat. gr. $\frac{1}{100}$.
Aquæ Anethi, ℥ ii. ter in die,

will usually effect a change speedily. If this should not have the desired effect the dose of atropine may be increased. The treatment is more successful with girls than boys; the latter not

unfrequently require some surgical interference for cure. In a number of cases the incontinence ceases the second night after taking the medicine. Atropine is equally useful in the vesical irritability of elderly persons; especially during the night when their rest is much broken by the demand to empty the bladder. By its stimulant effects on the respiratory centres, and its sedative effects on the vesical centres, atropine may be given with advantage in cases of chronic bronchitis with emphysema, where there is also vesical irritability.

CHAPTER XVIII

THE REPRODUCTIVE SYSTEM

§ 183. Partly in consequence of a certain feeling of repugnance to enter into the subject, partly in consequence of a consciousness that their inquiries would point to nothing, and elicit little of which they could avail themselves practically, a large majority of the profession are singularly ill-informed about the treatment of the affections of the reproductive system. They form, however, a large and important class of maladies, and cause not only local inconvenience, but excite disturbance, often of a serious nature, throughout the organism. How frequently does it fall to the lot of practitioners who have learned fully to recognize the importance of such maladies, especially in the female, to see patients sent up to them for grave ailments, accompanied by pallor and wasting, where a profuse leucorrhœa is the *fons et origo mali;* and yet not the faintest attempt to ascertain the real state of the case has been essayed. It is admitted universally that modesty is a great ornament to woman, and her privacy should not be intruded upon needlessly and unnecessarily; but at the same time it is worse than folly to permit illness and suffering to go unrelieved, the profession brought to discredit, and money spent without return, merely because a certain sense of shame restrains the practitioner and binds his tongue, when a few well-directed questions will solve the mystery. To some men this is almost, if not quite, impossible; and, recognizing the fact, they should send their patients, for once, at least, to some one who will make the necessary inquiries and institute the much-needed line of treatment. On the other hand, there are men who put their

questions so coarsely and rudely that the instinctive modesty of woman rebels and makes her dumb, to her own detriment. It is no unimportant matter to learn how to put interrogatories on these matters to women without making it awkward for them to answer. If the practitioner hesitates, then at once a difficulty arises: if he puts his questions in the same tone and manner in which he asks after the digestive organs, then the answer will come readily, and with a sense of relief to the answerer. It is also very desirable that the question should indicate that the inquirer knows what he is about, and is at home with the subject; if aimless and vague, a woman quickly discerns their worthlessness, and answers accordingly. This is a little divergence from the matter immediately in hand, but it is not altogether unnecessary nor without value.

§ 184. There are peculiarities connected with the reproductive organs which need consideration, and which separate them from all other organs. These peculiarities are connected with the functions of this system. During a great portion of even adult existence these organs are quiescent; but nevertheless they are more under the influence of our thoughts than any other part of us. Loose or lewd thought will induce an increase in the vascular supply to these organs in both sexes. When the evolution of puberty converts the child into the man or woman, the development of these organs gives a new direction to the thoughts of the individual, and the mental horizon is crowded with vivid and novel images. The consequence of this is that in many cases an habitual unchasteness of thought is instituted, though this is by no means the rule. In all except sexless creatures, there are general changes inaugurated which give ultimately the characteristics of each sex. Vascular excitement of these organs is often maintained to an abnormal degree, and endows the parts with an unwonted hyperæsthesia, far beyond what is normal; and this reacts again upon the nerve-centres until a condition of irritability is instituted of the most distressing character. It is not necessary that this should arise from coition or the substitutes for it; it is not unfrequently found amongst females who work with the double-treadle sewing machine, and who become so distressed thereby that they often abandon this form of industry altogether. The exhaustion of

the system generally, and especially the nervous system, by this hyperæsthesia and morbid action of the reproductive organs, is such that a most pitiable condition ensues; which frequently drives these sufferers to some medical adviser. They may come ready to reveal the facts, morbidly voluble about their condition; or they may come with some fictitious malady, or outcome of their state, but be resolutely determined to conceal the truth. Nothing but watchful, observant experience will or can guide the practitioner aright with the latter class of patients; and yet it is most important to recognize the primal mischief.

§ 185. *Anaphrodisiacs.*—When the truth is revealed, and it becomes apparent that the patient is suffering from debility or nervous erethism, the result of abnormal erotic excitement however produced, it becomes necessary to have recourse to such agents as possess the power of reducing and allaying this abnormal state of matters. For this end certain local measures are necessary, and certain agents given by the mouth are desirable. As to the local measures, the cold hip-bath, the bidet, or cold sponging, are all useful; indeed they should form as much a part of every woman's toilet as the washing of her face and the brushing of her hair. The false modesty of English girls often leads them to neglect hygienic arrangements of importance to which Frenchwomen are most attentive. Even injections of cold water in some cases would be conducive to comfort. All secretion permitted to remain becomes a source of irritation, which ought not to be allowed to exist. The bowels, too, should be regularly and systematically unloaded, and all irritation in the rectum removed: accumulations in the lower bowel always favour pelvic congestion and excitement. There should not be too heavy skirts hung from the waist; they prevent the return of blood from the parts below the line of attachment, and also heat the pelvis and its contents. Soft luxurious beds are also bad, and should be avoided. Horseback exercise, though otherwise healthful, sometimes produces vascular fulness in the pelvic viscera and a condition of unwonted activity in the generative organs which is undesirable. Daily and habitual out-door exercise is just as necessary for the maintenance of health in women as it is in men. Fencing, rowing, swimming, and cycling are all useful therapeutic agents. The girl who neglects to take steps to

maintain her physical vigour is almost sure to fall a victim to some uterine disorder in the long run.

Having taken such measures as affect the parts locally, and relieved them from the various sources of excitation to which they may have been subject, the question then arises of what to do remedially. The first step is to unload the bowels, and especially the lower bowels, for which purpose aloes is serviceable. By its action, when given in purgative doses, upon the hæmorrhoidal vessels, it relieves the vascularity of the reproductive organs. It is desirable, however, to combine it with alkaline and saline purgatives. All saline purgatives are anaphrodisiac, and more especially when alkaline. In all cases, then, where there is erotic excitement with fulness and tenderness of the ovaries, it is desirable to give something of this kind—

Sodii Sulph. ℥i.
Sodæ Pot. Tart. ℥ss.
Decoct. Aloes Co. ℨi.

once or twice a day. It should be given until the bowels are rather freely opened, and then continued so as to keep them open without actual purgation. In a few days the ovarian excitement will be much relieved, and with that an improvement in the general condition will be inaugurated. If it still persist with local congestion and erotic excitement, then bromide of potassium in ten or twenty grain doses, with tincture of senecio, may be added to the mixture; and this addition will be found sufficient to remove the most obstinate congestion, if the treatment be energetically followed out.

In many cases, however, the pallor and general debility contra-indicate any depletory measures, and then the bromide of potassium, or of ammonium, may be given with a bitter tonic three times a day; and the cold hip-bath, &c., be insisted on. If purgatives are inadmissible, then cold water enemata may be used to unload the bowels, especially at bed-time. If there are ascarides in the rectum, a weak infusion of quassia may be used as an enema, and an occasional dose of compound scammony powder may be given; this latter treatment is often necessary with young girls, where these seat-worms are often

the exciting cause of irritation of the generative organs. Not uncommonly they are the cause of much erotic excitement in elderly persons of both sexes. Bromide of potassium, and ammonium, are the best and most certain anaphrodisiacs we possess. Before their introduction alkalies, colchicum, and other less effectual measures were in vogue. In addition to these physical measures, there are moral measures of no mean value. The avoidance of excitement and temptation, or removal of residence, or travel, are often necessary. The arousing of the moral sense is very important. In other cases idleness and French novels must give way to more healthful excitement and occupation, especially in those where the erotic feelings are rather central than peripheral in their origin. Matrimony is often prescribed for those who actually suffer from involuntary and constrained celibacy; but it is a questionable piece of advice to offer. If there be a perfect and thorough understanding betwixt the contracting parties, then the objections fall to the ground: too frequently there is an unjust reticence which bears bad fruit in the future.

Disorders of the reproductive organs are by no means a monopoly of the female sex. Many men after the age of forty-five, or from that to fifty, are for all practical purposes impotent. A distinction must be made between impotency and sterility. To the condition in which the individual is physically unable to perform the act of copulation we apply the term impotence, whilst to the condition in which, although the sexual act is properly performed, the individual is incapable of fecundating the ovum furnished by the female, or in the case of the female is either unable to furnish the proper material to be fecundated or a proper nidus for the development of the ovum, we apply the term sterility. As Professor Lydston of Chicago has pointed out, the two conditions may or may not be combined. He says:—"As a consequence of removal of the testes the male may be entirely shorn of sexual desire, and is necessarily at the same time made incapable of producing the germinal material necessary for fecundating the ovum. On the other hand, the testes may be removed in some cases, and yet for a greater or less length of time the potency of the individual remains unimpaired. Stallions that are gelded when well along in age

are apt to retain their sexual desire and power; if, however, castration be performed when they are young, they are rendered both impotent and sterile. It is nothing unusual for owners of stock to keep on hand a horse that has been gelded late in life, for the purpose of gratifying the mares during the period of horsing. In horses of this kind emissions occur of a character somewhat resembling normal semen, although spermatozoides are necessarily absent." In the East eunuchs from whom both the testes and penis have been removed bring a much higher price in the market than those who have been merely castrated.

Men in whom the testes are intact, the penis having been removed, are impotent, although not of necessity sterile. If means were devised for bringing the semen of such individuals in contact with the healthy ovum, fecundation would be just as likely to occur as in individuals possessing perfect virility. Individuals who from various causes are unable to secure a perfect erection may nevertheless be capable of impregnating the female. It is not essential that the semen should be ejaculated into the vagina, for contact and emission, without penetration, may be followed by pregnancy, a fact not recognized with sufficient frequency.

Sterility in the male deserves much more consideration than is usually accorded it by physicians. According to Kehrer, the cause of childlessness is to be sought much oftener in the man than in the woman. Lydston points out that it is customary, when consulted regarding unfruitfulness in married life, for medical men to attribute the difficulty as a matter of course to some inherent incapacity or acquired morbid condition of the female. He says:—"It is probable that much of the effort that is directed to the cure of sterility in women is decidedly misapplied, the husband and not the wife being at fault. If we take into consideration the direct and remote results of gonorrhœal infection both in the male and female, the responsibility of the sterner sex in the matter of sterility may at once be seen to be considerable. It has been stated, by eminent gynæcologists—and I think with reason—that at least one-sixth of the cases of sterility which are brought to the attention of the physician, are due, not to difficulties in the female, but to

morbid conditions of the male. Sterility in the male is invariably the result of some morbid condition which either perverts the quality and vitality of the seminal fluid and renders it incapable of fecundating the ovum, or prevents it from escaping from the ejaculatory ducts."

The influence of gonorrhœa or urethritis in producing sterility in the male is not sufficiently recognized. Epididymitis is attended with the exudation of inflammatory lymph which may become organized and then contract to such an extent as to completely occlude the tubes and prevent the escape of the seminal fluid. Sterility in the male may be attended with no definite symptoms which will enable the practitioner to arrive at a positive diagnosis without the use of the microscope.

§ 186. In consequence of the vascularity of the reproductive organs, their position, and their function, the mucous linings of these organs are specially liable to become atonic, and give forth more or less profuse discharges. In man this is usually the result of gonorrhœa, or of having connection, either during the catamenia, or when the woman is suffering from leucorrhœa. In all these cases there follows a form of urethritis, generically termed blennorrhagia, in which there is rather a difference of degree than of kind. At first there is swelling of the mucous membrane, with itching, burning, and smarting, especially on making water; then follows a secretion, which either gradually passes away, or remains for long in a chronic condition, known as gleet. The line of treatment of such cases combines local and general measures. Soothing emollient injections of warm water with a little laudanum are useful in the first stage; while the food should be bland and non-stimulating. The bowels should be kept open with alkaline purgatives, and invariably unloaded at bed-time—a great means of avoiding chordee, and other troubles in connection with the generative instinct. After each act of micturition the urethra should be washed out with warm water, slightly alkaline. Modern surgeons as a rule give such remedies as copaiba cubebs and sandal-wood in the early stages, and do not resort to injections until later on. It is desirable to render the urine alkaline by the administration of potash; and also at the same time to give certain agents which pass out by the kidneys and exercise

a beneficial effect upon the urethra, as copaiba, sandal-wood oil, or buchu. Mr. Walter Spencer, Mr. Tubby and Mr. de Santi, Surgeons to the Westminster Hospital, speak highly of Gurjun oil in these cases. It is much more palatable than copaiba and rarely produces a rash. The following formula may be used:—

Gurjunæ Balsami, ℥ i.
Sp. Rectific, ♏ xv.
Sp. Chloroform, ♏ x.
Syrupi Zingiberis, ♏ xl.
Mucilaginis Acaciæ, ♏ lxxx.
Aquam, ad ℥.

A dose should be given three times a day after meals. If there is much nocturnal excitement a morphine suppository in the rectum, or a draught of Pot. Brom. gr. xxv., Tinct. Hyoscyami ℥ i., Mist. Camphor. ℥i., may be taken every night at bed-time. After the secretion is established it is usual to resort to astringent injections. It must not be forgotten that the discharge fulfils one useful function, viz., it keeps asunder the inflamed mucous surfaces, which would otherwise rub on each other, and so cause much discomfort. The injection of a mixture of carbonate of bismuth and Mistura Acaciæ, so as to form a soft plug in the male urethra, is in vogue in many of the Continental schools of medicine, and forms a plan of treatment much less disagreeable than any other, while it is very effectual. When there remains nothing but a gleety discharge, astringent and tonic injections, with a liberal dietary, are the best measures to be adopted. In many cases where the secretion is profuse, antiseptic injections are useful.

Much more frequent, and more innocent in their origin, are those discharges from the female genitals known as leucorrhœa. When the result of specific contagion, then they require the same series of local measures as are requisite in urethritis in man. General measures, except cooling medicines, are obviously useless in woman, as the urine does not traverse the affected surfaces;—women, however, themselves think differently. In both sexes the ectrotic treatment of applying nitrate of silver to the inflamed surface, either in stick or in strong solution, is

undesirable, being fraught with untoward results. In the majority of women leucorrhœa is the result of carelessness, inattention to personal cleanliness, of excessive use or irritation of the genitals; or of labour in warm rooms, and of close, heated sleeping rooms. Until the introduction of athletics for women the use of the tub was practically confined to men. Industrious women inhabiting confined rooms have intercostal neuralgia, the frequent accompaniment of leucorrhœa; they suffer from perpetual depression, and at the same time they are spare and pallid. Such women almost invariably have leucorrhœa, and all attempts to treat them without local remedies are ineffective and futile. In some cases the discharge is from the uterus, at other times it is vaginal. Sometimes it is profuse and persistent, scarcely affected by the catamenia, except to acquire a pink tinge; at other times it follows the menstrual flow, or comes on fitfully. In all cases it is necessary to resort to injections. If the discharge be slight, injections of cold water merely will often be sufficient to arrest it, or a weak solution of alum may be indicated. When at all profuse the vagina should be well washed out with cold or lukewarm water; after this the injection syringe should be filled with a solution of some astringent, of which alum is the favourite; and then the patient should lie down in the recumbent posture, inject, and lastly lie still two or three minutes. This last is important, as if it be not practised the astringent fluid runs out, and so does comparatively little good. There is no subject connected with themselves of which women are so ignorant as that of using an injection properly; and yet it is often very desirable that they should know. Such systematic injection, first of water and then of an astringent solution, should be practised twice daily, as long as any abnormal amount of secretion remains; and then the daily practice of injection with a weak astringent fluid should be continued for some time afterwards. The most scrupulous ablutions of the genitals should be practised by all. Many, however, do not know of its importance; some are filthy and indifferent; while others, as motherless girls, have no one to tell them, and no one to ask. To all motherless girls the medical man should ever be willing to give counsel, and to give them what they so much stand in need of, viz.,

information on these matters of personal hygiene. Not uncommonly barrenness is the consequence of leucorrhœa, and some women who find this out are more anxious to retain it than to do away with it. It is not desirable that the injections be used during the catamenia. In connection with this subject it is as well to bear in mind that persistent leucorrhœa is a common cause of sterility. There is of course no constant relation between the performance of the sexual act and the discharge of the ovum, so that it is necessary, in order that impregnation may be facilitated, that both the male and female elements shall retain their vitality for a certain time. If this were not the case it would be necessary for copulation and ovulation to occur simultaneously. It is probable that when the secretions of the woman are normal the spermatozoa remain active for a week or ten days. It is well known that the "mid-period" is the least dangerous as regards conception, for it is at this time that the ovum has reached its minimum degree of vitality, and between this time and the next ovulation the spermatozoa will have ceased to exist, especially if the woman is suffering from leucorrhœa or resorts to astringent or acid injections.

§ 187. The entrance upon her reproductive period of life in delicate women who take an indifferent amount of out-door exercise is almost invariably accompanied by a certain amount of disturbance of the general health; its cessation is not rarely, if not usually, accompanied by a considerable amount of erotic excitement, a period of active recrudescence of the generative instinct. Both periods commonly produce such disturbance as necessitates the calling in of medical aid. The first change, or puberty, is frequently accomplished under the circumstances of rapid growth; and the double tax upon the system produces in many cases a distinct debility, which may lead ultimately to tuberculosis, or other wasting disease. Commonly there are recurring periods of lassitude, weight, and sense of dragging in each groin, before the menstrual flow is actually established. Under these circumstances it is advisable to counsel the patient to sit over a vessel containing hot water, or, if that be not sufficient, to stay in bed and have warm cloths applied to the vulva; this last is a powerful means of exciting a flow from the genitals, and is useful not only at puberty, but at other times

when the catamenia have been checked, as by cold; and it is especially useful in any arrest of the lochia. In the last-named condition the application of hot cloths without delay, on the arrest of the lochial discharge, will often avert a grave condition. If these measures are insufficient, it is usual to give iron with aloes. There is no doubt that iron acts locally in these cases, as well as increasing the amount and improving the quality of the blood. In many cases the addition of savine-oil is a satisfactory measure. Savine is a powerful irritant and oxytoxic, and is used in toxic doses to procure abortion—a result which it brings about, partly by its general action as an irritant poison, partly by its local action. In small doses it seems to maintain a condition of vascularity in the generative organs. It is usual to combine these measures in a pill as follows :—

Ferri Sulph. Exsic. ℈ i.
Ol. Sabinæ, ℥ i.
Pulv. Pip. Nig. ℥ i.
Pil. Al. et Myrrh, ℥ ii.

to be divided into sixty pills, one to be taken twice a day after meals. This is an old and excellent formula. It is desirable to give such a dose of aloes as shall produce slight purgation, especially on commencing the course of iron. This last is an important matter for the attainment of success. These pills may be continued until the catamenia are established, together with warm hip-baths; and the employment of the measures mentioned above, whenever there are the usual premonitory symptoms of the catamenial flow being about to come on. The catamenia, not rarely, at first are irregular in appearance and in quantity, especially in some delicate girls; in others, again, they soon are profuse, and too frequent. When the patient is a robust and plethoric girl, the induction of the catamenia is often difficult and protracted, and in such cases active general depletory measures, and the application of a leech or two locally, are indicated.

In other girls again, especially in those that are delicate, or anæmic, the delay in the appearance of the catamenia is rather beneficial than otherwise, and need excite no apprehensions.

Mothers, especially of the humbler classes, are always anxious about the establishment of this function. They know that the non-appearance, or disappearance of the menses is often associated with the initiation of tuberculosis, or "decline" as they term it; and if the flux is initiated or restored it gives them much comfort. Important as the catamenial flow is in reality, women attach an undue importance to it and its derangements.

In the present day what has just been said about the absence of the menses in some young females is all the more important in that brain-culture is often carried on at the expense of the reproductive organs. A bright girl carries on her studies to a certain extent at the expense of her womanhood. There is something more than fashion in the choice that many women make, preferring a single life and brain-toil to the prospect of being a wife and mother. Often indeed amenorrhœa, more or less complete, will be found to have such associations.

The best remedies for functional amenorrhœa are the binoxide or permanganate of potassium and the tincture of senecio. No purgative is so good as aloes for its effects upon the reproductive organs of women. In small doses it excites the hæmorrhoidal vessels, and when so given with iron it is most useful in amenorrhœic states; when given in full doses it acts freely on these vessels, and when combined with other purgatives, especially cooling saline purgatives, relieves uterine and ovarian fulness famously.

The reproductive organs of woman are the source of most of her troubles during that period of her life when they are functionally active. Often will far-away irritation in the womb, or ovary, be found to be the cause of the most prominent objective and subjective phenomena manifested elsewhere. Irritation is not always felt where it arises; the pain is very commonly in the knee when the disease is in the hip-joint; in the right shoulder when the liver is involved. We know that the pregnant uterus, especially in the early months before it has escaped from the pelvis commonly produces very troublesome vomiting; or it may produce a persisting cough, known in Scotland as "a cradle cough." Vomiting is a common outcome of injury to, or acute mischief in the testicle; as it is a pronounced symptom of a calculus in the kidney. The old

term the "sympathetic nerve" was founded on the appreciation of the fact that one part was influenced by, or sympathized with another through the fibrils of this nerve. Currents may arise in the ovary and be felt—not there where they arise—but at some far-distant point, where they run out. If a number of ivory balls be suspended in a row, touching each other, and a tap be given to either terminal ball, it is the one at the other end which flies from its place. Consequently waves of nerve-perturbation, arising in the ovary, manifest themselves by disturbances elsewhere. The glittering flash which glances out from some female irides is the external indication of ovarian irritation, and "the ovarian gleam" has features quite its own. Usually there is a bright glittering sheen in the eyes which contrasts with the dead look in the irides of sexual excess, or profuse uterine discharges. Cough, palpitation, face-ache, usually on the right side, inframammary pain, usually in the left sixth or seventh intercostal nerves, and gastric irritation are the ordinary outcomes of uterine flexion, or ovarian disturbance. The most important matters clinically are the gastric symptoms reflexly excited by pelvic irritation.

Reflex disturbances of the stomach are so common that they call for especial attention. So important are these maladies, and so utterly unsatisfactory their treatment under the usual remedies—as bismuth, hydrocyanic acid, and oxide of silver—that they deserve to be treated at some length. In the first place it must be remembered that the stomach has different nerve-fibrils—those from the vagus, and those from the sympathetic. Claude Bernard observed that the application of a galvanic stimulus to the vagus fibres caused free secretion of the gastric juice; while the same stimulus applied to the sympathetic fibrils issuing from the semi-lunar ganglia, caused a diminution and complete arrest of the secretion. The action of sympathetic nerve-fibrils is to excite contraction in the arteries and arterioles; that of the pneumo-gastric fibrils to dilate these vessels. Consequently we can readily understand how currents coming in by the sympathetic tracts from pelvic, or other irritation, may contract the gastric arterioles, and arrest the flow of gastric juice. If the irritation be sufficiently

powerful, then vomiting is set up. In ordinary digestion the gastric blood-vessels are dilated and there is a free flow of gastric juice. The irritation coming in from without checks both these processes, and then imperfect digestion, with pain or nausea, is the result. This may not proceed further than loss of appetite, dyspepsia, and nausea: or there may be severe persistent vomiting set up by the introduction of food into the stomach, till a very serious condition may be reached. In either case the tongue is clean and there are no evidences of disturbance in the gastro-intestinal canal, as in primary gastric disturbance. Such is the dyspepsia so common in women. Primary dyspepsia is no more frequent in women than in men, and presents the same features in both sexes. But reflex dyspepsia has other and quite different associations. In both forms of dyspepsia there may be constipation, or diarrhœa, excited by the undigested food irritating the intestines; but these are incidental or coincident collaterals. In reflex dyspepsia there are usually the intercostal neuralgia, with the three tender spots of Valleix, one under the mamma, the second at the base of the left scapula, the third at the exit of the posterior root of the sixth or seventh intercostal nerve from the spinal column; and palpitation. Less commonly face-ache or cough, and in middle-aged women flushings. Then there are the uterine outcomes of the ovarian mischief—leucorrhœa, with or without menorrhagia; while at times the menstrual flux is lost, or all but lost, in the profuse leucorrhœa. The generative organs of women become turgid with blood during sexual excitement, approaching the erectile condition of the male organ under excitement. Ovarian irritation sets up vascular turgescence in the female parts which continues more or less persistingly. The consequence is that there is profuse secretion, often with excessive catamenial losses. Frequently, too, there are erotic dreams, recurrent orgasms, during sleep, "the period *par excellence* of reflex excitability." In more pronounced cases, these discharges take place in the waking state, without any reference to psychical conditions; being found alike in married women cohabiting with their husbands, and in spinsters and widows. That sexual excitement may be produced or kept up by lewd thought may not

be denied; but this is not necessarily the psychical attitude here. The uterine centres in the cord and the centres presiding over the bladder lie in close proximity to each other. The irritable condition of the lumbar centres of the reproductive organs is communicated to the vesical centres, and then a very distressing condition results, viz., a state of weakness and irritability in the bladder; and the call to make water is sudden and imperative and must be attended to at once, or a certain penalty be paid for non-attention. Such are the objective and subjective phenomena exhibited in a complete case of "reflex dyspepsia" of ovarian origin: and it is by the study of such well-marked cases that the student will learn to recognize the less marked or imperfect cases. Nor does it necessarily follow that the symptoms shall stand in a definite proportion to each other in each and every case. Sometimes the chief disturbance is uterine, at other times mainly gastric. When the latter, the case often runs as follows—a girl, usually of the neurosal diathesis, betwixt nineteen and twenty-four years of age, becomes the subject of intractable vomiting. This goes on till such weakness is produced that the patient is confined to bed and her life apparently endangered. The least particle of food is immediately rejected, more or less completely. All sorts of combinations of drugs are tried and fail to procure any alleviation of the condition. The medical attendant is nearly worried out of his life, consultants are called in without avail; the friends of the patient are worked up to a state of feverish anxiety; the sufferings of the patient are not inconsiderable; and so the case wears on for weeks. Bismuth, hydrocyanic acid, opium, effervescing mixtures, champagne, milk and seltzer water, beef-tea, hot and cold, raw meat pounded, maltine, all are tried and fail; sometimes enough is retained to support life; at other times it becomes necessary to resort to nutritive enemata. All who have seen much practice are familiar with such cases, which are very trying to all parties concerned, and are unaffected by the different remedial measures resorted to; and which seem at last to wear themselves out, and are followed by long and tedious convalescence. A year or two afterwards the patient is in good health, often a happy mother. Here the absence of local

indications throws the medical man off the scent as to the real nature of the malady with which he is brought in contact, and the ovaries are unsuspected. All the remedies are futile and inoperative because not directed to the origin of the trouble. The case lingers on till it would seem the general mal-nutrition starves down the congested ovary into quietude, and then the reflex disturbances cease. Were the true origin of the case known or discovered, the successful treatment would soon be forthcoming.

What is the treatment of these cases? It consists of several factors each essential and complementary to the others. The bowels should be unloaded, so that there shall be no pelvic congestion. A small quantity of sulphate of magnesium in each dose of medicine will usually attain this end. If not quite sufficient an aloetic pill at bed-time is indicated. In small doses, as said before, aloes excites the hæmorrhoidal vessels; in fuller doses it depletes them. The bowels should be emptied at bed-time. A load in the bowels during sleep produces vascular turgescence in females whose reproductive organs are out of health; just as it produces chordee in a man with gonorrhœa. Then comes the other factor—the reflex manifestations. Instead of treating the stomach, an agent must be given which will influence the nerve tracts over which the perturbatory waves travel. Bromide of potassium deadens the nerve fibrils, alike along their course and at their peripheral endings. Both at the periphery in the ovary and at the terminus the stomach, is its influence felt. It blunts the nerve endings while it deadens the conductive power of nerve fibrils. A combination such as the following is useful:—

Magnes. Sulph. ℈ i.
Potass. Bromidi, ℈ i.
Mist. Camphoræ, ℥i., ter in die.

If the stomach reject this a hypodermic injection of half, or a third of a grain of morphine will usually produce such effects that the stomach will tolerate the medicines. Nutritive enemata may be needed for a day or two. As soon as the

bromide is tolerated and retained, matters improve. Sometimes it is well to substitute infusions of gentian for the camphor mixture as a vehicle; it acts beneficially upon the stomach, as do all bitters, and renders it more tolerant of the medicines. Local treatment in the shape of a blister over the tender ovary is of much value; not only does it produce a mental impression, but we have reason to suppose that nerve-waves can meet and neutralize each other—like rays of light—under certain circumstances. The ordinary Emplastrum Cantharidis 2 × 2 in. applied over the offending ovary, on going to bed, will usually be found to produce vesication by the morning. Some slight soreness follows, but the relief afforded to the internal pain far outweighs this. In some rare instances a crop of boils follows the blister; but so rarely as not to militate against its use. By these measures combined the reflex gastric disturbance is effectually removed.

There remains the leucorrhœal loss to be considered. The rubber syringe, or the common enema syringe for infants are preferable to the glass syringe, which is brittle, so that accidents sometimes occur. First an injection of plain water to remove all discharge, and then of a little alum water, not stronger than an ounce to two quarts of water, will usually soon reduce the loss. If there also be menorrhagia the usual measures must be adopted.

§ 188. The decline of woman's reproductive life is termed "the menopause." It is a very important epoch in a woman's career. It is then that constitutional exhaustion, as repeated childbearing, shows itself in broken, disturbed health. Then it is that constrained celibacy reveals the strain to which the system has been subjected; and nymphomania, or imprudent and reckless attachments are common enough at this time. The insanity to which so many spinsters become subject at this period is usually erotic in its nature. There is a flashing out of the sexual instinct before it is extinguished, and woman becomes once more almost a sexless creature.

At times the disturbed health precedes irregularity in the catamenia, at other times menstrual irregularity of various forms precedes any disturbance of the general health. Women often allow themselves to drift into a bad state of health about

the time of the change of life, thinking it is the change. In this condition the actual change comes, and tells hardly upon them in their reduced state. If there is a suspicion that this change is at hand—and an inquiry into the history of the patient's family in this respect will often give useful information—then it is desirable to place the patient under strict orders, and to guard the health most vigilantly. Even if there is no actual ill-health, it is well to take measures to prevent any breakdown; the better the health of every woman on entering this period, the less will she suffer during it; if the health be broken to commence with, then there will be much suffering and ill-health ere it be accomplished. In the majority of cases the most watchful care is desirable, and the avoidance of illness is as important as is its relief. If the catamenia are profuse, it is as well to restrain this by astringent measures, as gallic or sulphuric acid, with extract of ergot, a few days before the flux is expected; if this binds the bowels, it is well to combine with it a sufficiency of sulphate of magnesium to keep them open. It is often more efficacious to restrain the loss of blood, than to make up the blood during the interval by ferruginous preparations. There is one thing, however, to be borne in mind about the use of purgatives during the menopause, and it is this: all cathartics and laxatives must be combined with carminatives in considerable quantities, else they will certainly disagree with the patient. There is a great tendency at this time to flatulency, and, unless the purgatives are accompanied by full doses of black pepper, cayenne, peppermint, or some similar agent, each dose of medicine will cause flatulence and griping: the latter often to a very troublesome extent. The remembrance of this fact will often stand the practitioner in good stead with an important class of patients. There is apt at this time to be much palpitation, best treated by digitalis and bromide of potassium, and a belladonna plaster; dyspepsia, requiring a well-regulated dietary; constipation, to be treated as above; and a good deal of mental depression and neuralgia. If there is also, as not rarely happens, a profuse discharge, then the measures to be shortly mentioned as appropriate to menorrhagia, should be employed. For two or three years, in many cases, the health at this time must meet with the most

sedulous care, and the results will well repay the attention so bestowed. There is often a long period of good health and enjoyment of life after this stormy epoch, well worth the purchasing by a little extra care at the time.

§ 189. Arrest of the menstrual flux is always an important matter, and needs looking to. Not unfrequently there is a vicarious flow, complete or incomplete, as in hæmoptysis, for instance, or in hæmatemesis; and much needless alarm is often created thereby. At other times it is the result of exposure to cold during the period, or perhaps even of deliberate stoppage by some foolish girl in order to go to a ball or some other amusement. Under these circumstances the disturbance of the general health is often considerable; but whatever it is, and whatever the measures adopted to relieve it, it must always be borne in mind that the most effectual of all measures is to restore the flux. If consulted sufficiently early the practitioner will do well to advise hot hip-baths, hot cloths to the vulva, and the internal administration of drachm doses of tincture of Senecio Jacobœa every four hours; if the flow can be re-established all usually goes well. If too late, or the efforts are unsuccessful, then the case must be watched, and when the next period becomes due, the same measures are to be repeated. If this were only sufficiently well known and practised, much ill-health and suffering would be saved. At other times the arrest is due to general ill-health, or confirmed anæmia. In cases of pronounced anæmia it is well to add arsenic to the ferruginous medicines, a thirty-second of a grain of arsenious acid being added to each dose. Small repeated doses of arsenic are often of the greatest value in a course of steel and laxatives; and if such course does not seem to be beneficial, arsenic should always be added. In many cases amenorrhœa is an indication of failing health, and its treatment then merges into that of the general condition.

Scanty menstruation is often a normal condition, which should not be rashly interfered with. During rapid growth, or pronounced anæmia, or early phthisis, the loss entailed by the usual catamenial flux forms a drain it is well to permit to remain limited; and attempts to restore the flux until the system generally is equal to it are unfortunate—when they happen to

be successful. If the treatment by tonics, chalybeates, and a liberal dietary succeed in restoring the menstrual flow, by producing general improvement, good and well; the reappearance of the discharge is a sign of good omen. But any attempt to restore the discharge *pur et simple* without regard to the general condition with which it is associated is harmful where it is not futile.

If amenorrhœa is persistent in spite of well-directed measures continued for some time, it is as well to examine the patient to see if she is normally formed. It occurred to a doctor to examine a patient, who had been under treatment for three years for delayed menstruation. This at once cleared up the difficulty—the girl had no vagina.

§ 190. Menorrhagia is a serious as well as common ailment among women. It arises in a variety of ways. It is causally associated with soft, luxurious beds; with the hanging of heavy skirts around the waist; with labour in moist, warm rooms, as seen in laundresses, and with toil in warm or close rooms, as seen in mill-girls and maids-of-all-work, who are more subject to menorrhagia than the servants of large establishments, excepting cooks: it is found as one of the consequences of cardiac failure with resultant venous congestion; it is not unfrequently the consequence of erotic excitement in young girls, and of imperfect, or unattainable, as well as excessive coition in adults; or it may be the result of some more serious condition, requiring the manipulative interference of the obstetric physician. In all cases it must be regarded with relation to its causation, if we wish our medicinal measures to be successful. Amidst the bulk of the profession, especially of the past generation, the matter of menorrhagia was too commonly ignored, or women were taught to regard it as a condition against which the therapeutic art was powerless. Never did a more profound mistake exist: for this ailment is one of the most tractable of maladies ordinarily; provided the treatment be thoughtful and judicious. What the different lines of treatment are will now be given.

One of the commonest forms of menorrhagia is that furnished by young girls, from fifteen to eighteen usually, who are unwell, and freely so, from five to seven days. There is nothing about

them to indicate the necessity for, or the desirability of such a drain. It is the outcome of erotic excitement, and not rarely of masturbation resorted to in order to procure relief. Under these circumstances the use of the hip-bath and astringents are inferior in value to the use of anaphrodisiacs, and especially of the bromide of potassium, or ammonium. These remedies lessen reflex conduction, and act strongly upon the peripheral ends of afferent nerves. As a result there is less local sensation and diminished erotic feeling, less centric activity, less vascular excitement of the generative organs, and a moderate menstrual flow. In fifteen or thirty-grain doses thrice daily, bromide of potassium exerts a powerful effect over the menorrhagia of the young, especially if at the same time the bowels be attended to by sulphate of magnesium with alkalies, the vehicle being camphor mixture, or if desirable a vegetable bitter. Not rarely a perfect suspension of the catamenia is the result, and in cases of rapid growth such a consequence is far from undesirable. The withdrawal of the bromide is soon followed by the reappearance of the flux. In many cases of anæmia in young girls, associated with heavy monthly losses, it is desirable to give some chalybeate remedy together with the bromide. The tartrate of iron goes well with bromide of potassium in these cases; and the bromide seems to prevent too much action of the iron upon the reproductive organs, while the iron tends to improve nutrition; or quinine may be given instead.

In more mature adults, and especially in married women, menorrhagia is commonly the result of debilitating conditions, or occasionally of excess. Under these circumstances another line of treatment from that described above is necessary. The leading idea here is to moderate the loss by astringent and other measures, not anaphrodisiac. In order to produce the best effects, it is well to divide the treatment into two sections, viz., the treatment of the period and the treatment of the interval. To commence with the treatment of the period: it is well for the patient to avoid all exertion, to keep as quiet as possible, and certainly to avoid all straining at stool. Then all food should be taken as cold as possible; tea, milk, soup, everything should be cold, or even iced. It is the common

practice of women to drink hot tea as a stimulant in the depression produced by the loss; and the consequence is that while they experience an immediate sense of relief of a brief character, in a few minutes there is a profuse flow. The well-known effect of heat upon the heart, increasing its activity, as well as its effect in enlarging the calibre of blood-vessels, renders this result intelligible enough, as well as explaining the good effects of cold fluids. In addition to these measures it is well to give an astringent mixture, as the following :—

℞ Magnes. Sulph. ℥ ii.
Acid. Sulph. Arom. ♏xx.
Inf. Quass. ℨi., ter in die,

regulating the amount of the magnesium to the requirements of each individual. Sulphate of magnesium exerts an astringent action elsewhere than in the bowels. It can thus often be profitably combined with astringents. If there is much suffering, a few drops of laudanum may be added to the mixture. If the loss be still profuse it may be desirable to add at bed-time this pill—

℞ Cup. Sulph. gr. ½-1.
Pulv. Opii, gr. 1.
Ext. Al. Aquos. gr. ii.-iii.,

and even to take it again first thing in the morning, if necessary. It is a point of moment to so combine the astringents with laxatives as not to lock up the bowels. If the loss is very profuse and persistent, the application of cold cloths to the vulva may be indicated. Just as hot cloths so applied increase the discharge, so cold ones tend to arrest any flow from the genitals : it is not desirable to apply these cold cloths unless the discharge has persisted for several days, and is profuse. Even cold astringent injections may be found necessary. If the menorrhagia has existed for some time it may be found a good plan to commence the treatment of the period a day or two before its actual appearance, whether the case be one for astringents or anaphrodisiacs.

Next, we come to the treatment of the interval. If there is

leucorrhœa, astringent injections must be assiduously practised, during the whole interval between each period. The patient must sleep on a hard bed, with but light bedclothes; no treatment is efficacious if the patient lie in soft feather-beds, which heat the pelvic organs extremely. The bowels must be kept open, and in many cases, especially where there is much neuralgia, facial or intercostal, chalybeates must be combined with laxatives. It is not improper to give iron in menorrhagia, but it is desirable to restrict it to the interval, and to use some astringent form. In many cases a few drops of tincture digitalis, or a dose of liquid extract of ergot, may be added to the mixture, both during the period and the interval, with advantage. In the case of married women it is well to forbid all marital intercourse; otherwise, the treatment is often inefficacious. By the union of these different measures, and a watchful attention to the case so as to make the different changes as soon as ever they are indicated, most cases of menorrhagia can be cured, or at least much relieved. When it is the result of heart-failure, then digitalis and tonics should be exhibited freely.

There is, however, one class of menorrhagic women whose malady is extremely intractable. They are usually stout women, with large and full abdomens. They are usually troubled with flatulence, and have either constipation or diarrhœa. They are either widows, or their husbands are either partially impotent, or away for long intervals. In some cases coition is unsatisfying from the use of the condom. In almost all these cases there is enlargement of the womb, always excessive menstrual flux, and usually leucorrhœa. That such cases should be intractable is no matter for surprise. The patients, however, are generally little benefited by purely medicinal treatment; they are pleasant patients enough, but most practitioners consider that there is but little to be done for them. The condition takes its origin in local derangements themselves, arising from causes which do not readily admit of removal.

In the treatment of menorrhagia, no matter of what form, it is always a good plan to relieve the anæmia and improve the general condition, by moderating the loss. If this be not checked the state of anæmia is perpetuated; the making of

blood during the interval is rapid, especially under the spur of chalybeates, and thus a condition of alternating loss and swift repair is instituted. For such a state it is much better to substitute a more even and regular condition; and this is often best secured by checking the loss, and not spurring on blood formation in the interval. There is another point, too, worth remembering in the matter of menorrhagia, or any uterine hæmorrhage, and it is this: syncope is the natural treatment of hæmorrhage; and when there is profuse loss, this is not always to be treated as an evil, although it is certainly an indication for prompt treatment. The injection of cold water into the bowels is often of service in the case of internal hæmorrhages. Astringents and cold are excellent agents, but these are much more efficacious when combined with thought and a fair knowledge of physiology.

Menorrhagia is a common cause of sterility, but it does not follow of necessity that because a woman loses too much at the monthly periods it accounts for her being childless. The problem is a much more complicated one. "Leaving the question of impotence out of consideration, it is a well-known fact that sterile marriages are occasionally observed where both husband and wife are perfectly capable of procreation, yet for some peculiar reasons the elements necessary for conception have apparently no affinity for each other, and this independently of the question of sexual passion. The truth of this assertion is shown by the fact that in many instances individuals who have been childless in a first marriage have married again and have reared large families. The physiological question involved under these circumstances is well recognized by stock-breeders, who find, for example, that certain mares cannot be fecundated by a stallion that is perhaps distinguished by the multiplicity of his progeny, but who are readily impregnated if covered by another stallion." (Lydston.)

§ 191. Dysmenorrhœa is a painful and distressing condition. It may precede or persist through the menstrual period. Usually it precedes the appearance of the discharge. The pain is often so acute as to cause the sufferer to roll about the floor in agony. The treatment ordinarily adopted in all countries is to give alcohol with hot water under these circumstances. The relief so

afforded is often very great, so much so that the late Sir James Simpson asserted that this constituted the worst feature in the treatment. The relief afforded by alcohol in this condition, he asserted, was one of the commonest causes of ultimate excessive indulgence in alcohol by women. Having learned to resort to it then, he declared they were led to resort to it at other times; and he advocated strenuously the use of any other stimulant than that which is at hand in almost every sideboard. Sal volatile, spirits of chloroform, anything, indeed, but alcohol, he advised, as being equally efficacious and being free from the dangerous allurements of the other. Amidst women there exists a widespread belief in the virtues of pennyroyal in painful menstruation. The Oleum Pulegii is a harmless remedy in ordinary doses, and a few drops at these times may be recommended with advantage; especially as orthodox medicine has nothing to substitute for it. It seems specially useful in cases where the loss is scanty and the pain intense. Further experience of it is much in its favour. Four drops on a knob of sugar four times daily, commencing the day before the flux, and continued for two days after its appearance, often gives surprising relief. It reduces the pain and increases the loss. Where the loss is great it is less useful. It is an agent worthy of more attention than is bestowed upon it at the present. The ancients knew its value. The tincture of cimicifuga is another valuable remedy, and the tincture of senecio is well worth a trial. Hot drinks, the warm hip-bath, or warm cloths to the vulva, are all useful, to some extent at least. When there is a thick membrana decidua thrown off at each period, a process like that of parturition is unavoidable. For its relief special obstetrical treatises must be consulted. At other times, dysmenorrhœa arises from too narrow a cervix; the treatment here also is beyond the sphere of the present work. Not rarely dysmenorrhœa is the consequence of latent gout—is one of its manifestations, indeed. Here the treatment of gout is necessary for the relief of the local malady. At other times the dysmenorrhœa is ovarian, and the pain shoots down the thigh in acute paroxysms, while the ovarian region is painful and tender to the touch, often acutely so.

There is much more that might be said about certain conditions

of the reproductive organs in women, such as misplacements of the uterus. It is obvious that when misplacement of the womb is the cause of unpleasant symptoms, its replacement is the rational practice. How this is to be done, and what are the lines of treatment of many maladies incidental to pregnancy, the management of the act of parturition, and of the puerperal state cannot be entered upon here. All that may be said is that in pregnancy many of the troubles arise from irritation caused by the enlarging womb, and then —the cause not admitting of removal—it is desirable to check nerve-conduction, and arrest reflex action by the administration of bromide of potassium, and other remedies which diminish action in the nervous system. In the vomiting of pregnancy it is also of moment to give the food in such small quantities at once that the stomach will tolerate its presence, reducing the amount to what the stomach will tolerate, no matter to how small a quantity it must be diminished. By perfect quietude in bed much toleration is given; as well as the wants of the system being thus reduced to a minimum, and the necessity for food thus being lessened.

The proper management of the troubles to which women are liable in consequence of their sex is of the utmost importance to all, and especially to young practitioners.

CHAPTER XIX

THE CUTANEOUS SYSTEM

§ 192. BEFORE considering the diseases of the skin, it will be well to review some matters concerned with its physiological function as a secreting and excreting organ. The skin is not merely the sensitive covering of the body, but possesses great functional utility. In lowly forms of life the outer surface is also the general excretory surface, and the various specialized excretory organs of higher life are but involutions of the general tegument; preserving in the midst of their specialized action more or less of their primitive function, and capable of supplementing each other's action when deficient or arrested. The skin aids the lungs in the excretion of carbonic acid when the lungs are disabled by disease. It also possesses, to a large extent, the power to excrete nitrogen that is usually assumed to be the peculiar property of the kidney. The power of the skin to excrete urea is well known. Thus we act freely upon the skin when the kidneys are insufficiently active, or crippled by disease, and so unequal to their duty of blood depuration. The sweat-glands are governed directly by the nervous system, and though an actively perspiring skin is in health a flushed skin, the vascular dilatation is a condition and not the chief cause of the secretion. The exact position of the sweat-centres has not been ascertained with absolute certainty, but these are two in the cat, one for the fore-limbs in the lower part of the cervical cord, and one for the hind-limbs, at the junction of the dorsal and lumbar regions. Stewart in his *Physiology* points out that the evidence of the direct secretory action of nerves on the sweat-glands is singularly striking and complete in

contrast to what we know of the kidney. "In the latter, blood-flow is the important factor; increased blood-flow entails increased secretion. In the former, the nervous impulse to secretion is the spring which sets the machinery in motion; vascular dilatation aids secretion, but does not generally cause it." The broad differences between the skin and the kidney are clear enough, and the explanation is probably to be found in the essentially different purpose of the two secretions. "The water of the urine is in the main a vehicle for the removal of its solids; the solids of the sweat are accidental impurities so to speak in the water. The kidney eliminates substances which it is vital to the organism to get rid of; the sweat-glands pour out water, not because it is in itself hurtful, not because it cannot pass out by other channels, but because the evaporation of water is one of the most important means by which the temperature of the body is controlled." (Stewart.) The utility of the cutaneous surface in dissipating heat, in maintaining a normal temperature in health, and in reducing pyrexia, is also generally recognized. The loss of heat in the evaporation of the water thrown out by the sudoriparous glands is very considerable; and consequently in pyretic conditions we not only attempt to reduce heat-production, but we also essay to increase the heat-loss by exciting further activity in these glands. For these ends we resort to a class of agents termed diaphoretics.

The Theory of Diaphoretics.—The means of acting upon the skin so as to increase the amount of fluid excreted by the sudoriparous glands, are various. They include the application of external heat and the administration of certain medicinal agents. The skin undoubtedly eliminates medicinal substances, but we do not administer diaphoretics so much on the hypothesis that these agents produce diaphoresis by exciting the sudoriparous glands into activity, as that they exercise some action through the nervous system, especially the vaso-motor system, and so excite diaphoresis. The diaphoretic action of jaborandi and pilocarpine, and of aconite and antimony, is familiar to everybody. Some diaphoretics are also nauseant and depressant agents, lowering the circulation as well as increasing activity in the sudoriparous glands. Under con-

ditions of depression there is a tendency to perspiration, and in great anxiety there is an increase in the amount of water exuding through the skin; as seen so frequently in candidates for examination when before the examiners. The secreting action of the skin is influenced by general conditions of the vascular and nervous systems. It is quite certain that through the influence of the latter the secretion may be excited or suspended; this is seen on the one hand in the state of syncope, and in the effects of depressing emotions, especially fear, and its more aggravated condition, terror; and on the other, in the dry condition of the skin during states of high nervous excitement. In syncope and in angina pectoris beads of sweat collect on the pallid skin, and demonstrate that perspiration does not necessarily depend on a high vascular condition of the skin, but that it may be found where the skin is blanched and cold, from lack of arterial blood. The nerve arrangements of the sudoriparous glands have only yet been partially demonstrated, but it seems very probable that these glands possess secretory nerves which may be acted on, and excite secretion, without any necessary apparent increase of vascularity in the skin. The large plexus of capillaries at the base of each sudoriparous gland enables this to be brought about.

On the other hand, there may be great cutaneous vascularity without any action of these sudoriparous glands. Leyden found that there was no fluid given off by the skin in rising fever, and this loss of perspiration is one of the causes of the pyrexia. It is quite clear that vascularity of the skin and perspiration do not necessarily go together; though they usually do, as seen in the moist and glowing skin produced by muscular activity.

Some of the most powerful medicinal diaphoretics are depressant agents, whilst in others this action is not well-marked; pilocarpine for example is not a depressant. There are others which are not depressant, as acetate of ammonium, ipecacuanha, sweet spirits of nitre, and salts of potash. But in pyretic conditions with a dry skin aconite and antimony are more useful. When it is desired to utilize the action of the skin for the lowering of temperature we resort to these depressant diaphoretics; when we wish to excite it for excretory purposes, the warm bath is to

be preferred. The application of external heat is the best mode of inducing perspiration with normal temperatures, but is not much resorted to in the treatment of pyrexia, except in children, and in conjunction with depressant diaphoretics. Diaphoretics may be used in all conditions of pyrexia, especially with a dry skin, and are very useful in the acute diseases of the respiratory organs. Thus in bronchitis great relief is experienced when the skin acts freely. The state of turgescence in the bronchial mucous membrane is relieved thereby, and secretion follows. It seems necessary in all cases of vascular turgescence in secretory surfaces to give vascular depressants in order to secure secretion. This is alike seen in the dry, swollen mucous membrane of the air-tubes in the first stage of bronchitis, and the dry, burning skin of febrile conditions. The secreting nerves of the sudoriparous glands seem to be most powerfully acted upon by depressants, whether emotional or medicinal.

Opium is a powerful sudorific, especially when combined with ipecacuanha or a depressant like antimony. In opium poisoning the skin is blanched, cold, and bedewed with perspiration. On the other hand, in belladonna poisoning the skin is vascular, dry, and burning.

The application of external heat is a ready means of exciting perspiration; in the dry, imperspirable skin of some subjects of chronic Bright's disease, the application of cold is required to paralyze the contracted blood-vessels, and so lead to subsequent dilatation of them and cutaneous secretion.

The most remarkable sudorific we know of is jaborandi. It is a most potent agent for the purpose of producing perspiration. "The sweat produced by a single dose of jaborandi or pilocarpine is often enormous in quantity, amounting not unfrequently to half-a-pint or more. Usually the chlorides are in excess, the carbonates and phosphates are present in very minute quantities, whilst the urea exists in more than five times the normal proportion, the amount eliminated in a single sweating ranging from ten to fifteen grains. Pilocarpine produces sweating by its action on the peripheral nerve apparatus, and not by any influence on the sweat-centres in the cord." (Murrell, *Pharmacology and Therapeutics.*)

Diaphoretics constitute a large class of remedies of much

importance in practice. The depressant, or nauseant members of the group, are those best suited for the treatment of pyrexia; while for other conditions the less depressant members are better fitted. Thus in chronic bronchitis of rheumatic or gouty associations, iodide of potassium, with guaiacum or serpentary, is a very good measure. In conditions of renal inadequacy salts of potash are always to be combined with diaphoretics; and with many persons potash salts are as diaphoretic in summer as they are diuretic in cold weather. They aid in the efficiency of the hot bath when required in conditions of uræmia, or lithiasis.

At other times the skin acts too profusely; and the excessive perspiration is objectionable, and a source of much exhaustion. Sweat is usually acid, but when profuse becomes neutral, or even alkaline. With an increase in the quantity of fluid excreted by the skin there is also an augmented excretion of solids; and to the deficiency which is thus produced in the salts of the blood may be partly assigned the debilitating effects of profuse perspiration. We are all familiar with the great exhaustion caused by profuse sweating in hectic fever, and especially when associated with phthisis. In conditions of great debility profuse discharges, especially of the skin and bowels, are apt to show themselves, and are most serious. The term colliquative is applied to these discharges, and of old it was said that the tissues of the body were melted down, and discharged from the system in these profuse excretions or secretions. Even when not so excessive, sweating and purging are often troublesome matters, causing much exhaustion. In affections of the lungs nocturnal perspiration is one of the most serious matters we have to contend with. In very many cases the arrest of the profuse perspiration at once inaugurates an improvement in the general condition. This brings up the subject of anhydrotics.

Theory of Anhydrotics.—It is here necessary to make a word. Hydrosis is profuse perspiration, and by the addition of the alpha (*a*) privative we readily reach the adjective anhydrotic. The anhydrotics are a very valuable and important group of remedial agents. This group may be extended to include astringents, vegetable and mineral, both salts and acids.

Astringents possess decided properties, but the explanation of their action is not yet furnished to us. They are soluble substances, and wherever there is a profuse flow there they are found, and exercise an arresting influence. Sulphuric acid, sulphate of copper, pernitrate of iron, acetate of lead, oxide of zinc, gallic acid and tannin, are all useful in checking profuse perspiration. The most typical anhydrotic is undoubtedly belladonna. This drug may be termed a specific anhydrotic; and it is almost certain that it exercises its effects by some special property and influence over the secretory nerves of the sudoriparous glands. Atropine arrests secretion in the salivary glands, and acts specially on the submaxillary gland through its secretory nerve—the chorda tympani. Galvanization of the chorda tympani is powerless to excite secretion in the gland after the administration of belladonna. Heidenhain indicates that other glands, the secreting nerves of which have not yet been found out, may be affected by belladonna, as is the submaxillary gland. Certainly belladonna arrests the action of the sudoriparous glands, even when a red rash is produced by it; showing that even with increased cutaneous hyperæmia there may be not only no increase, but actually an arrest of perspiration. "A marked antagonism exists between atropine and pilocarpine. Atropine dilates the pupil, pilocarpine contracts it. Atropine dries the skin and mouth, whilst pilocarpine induces perspiration and salivation. A hypodermic injection of a hundredth of a grain of sulphate of atropine will immediately arrest the salivation and perspiration induced by jaborandi or pilocarpine." (Murrell, *Pharmacology and Therapeutics.*) The antagonism of action of these two drugs on the skin and salivary glands is alike interesting and instructive. So is the opposite action of opium and belladonna upon the skin. That belladonna possesses some direct action upon the sweat-glands is demonstrated by its utility as a local application, as in perspiring hands. Belladonna liniment, or a solution of atropine, produces an arrest of the activity of the sudoriparous glands of the area to which it is applied.

It is not in the hydrosis of lung disease alone that belladonna is useful; it is equally effective in profuse perspiration with other associations. Hydrosis is always found with conditions

of adynamy, which it distinctly tends to aggravate. The use of anhydrotics should always go hand in hand with the exhibition of tonics and hæmatics. Fuller counsels food and an alcoholic stimulant at bed-time as useful in the nocturnal perspirations of phthisis.

Hyoscyamine in composition and action is closely allied to atropine, if not identical with it.

§ 193. The diseases of the skin, from their ready appeal to the eye, have always rather been regarded as forming varieties, allied to each other by points of resemblance, than looked at from the point of view of their causation. It is only during the last quarter of a century that it has become the rule to investigate the causal associations of other maladies of the skin than those of syphilitic origin. And yet this is the only plan by which the student can ever get beyond the mere recognition of the form of the disease, and the proper application of one of the many synonyms which now exists for each form and even variety of skin affections; or the use of the routine remedies as mercury, tar, alkalies, sulphur, or borax. In order to comprehend the affections of the skin and the indications for the treatment of each, it is necessary to remember and recognize the structure, the function of the skin; and its liabilities to injury, and to parasites in consequence of its being our external covering.

The skin is a very vascular organ and is thus liable to variations in its blood supply, to anæmia or to hyperæmia, and as a consequence, to many maladies which take their origin in malnutrition, such as pemphigus; and to others the result of excessive nutrition, as molluscum fibrosum, icthyosis, corns, &c. It is also liable to acute morbid conditions covering a considerable area, as erythema and erysipelas, or more especially localized as furunculus and carbuncle. As to these acute conditions, they have to be treated on general principles; and, then, if a large surface is involved, either some agreeable external application, as cotton-wool, flour, or warm lead and opium lotion, or other soothing mixture must be adopted; or, if the disease be local, it is well to pass a knife through and through the inflamed mass, so as to relieve the different nerve fibrils from the pressure of the new growth, or cell accumulations, and

the consequent pain. The acute affections of the skin present comparatively few points of difficulty for the student, or practitioner. The more chronic maladies of perverted or defective nutrition, and of hypertrophic growth are much more troublesome affairs. They must be looked at from several points of view. Defective nutrition of the skin is commonly associated with general defective nutrition, but not necessarily so. On the other hand, local pervertions of nutrition, even of a hypertrophic character, are not necessarily incompatible with low general nutrition; nor are they always associated with a full habit of body. In all cases it is as necessary to take into consideration the general condition of the individual as it is to recognize the peculiar characters of the eruption, or to select a form of external application. It is impossible here to attempt to give any detailed account of the various affections of the skin; and to give a mere list of names under the headings of imperfect or excessive nutrition would be useless, if not absurd and often incorrect. The point here insisted upon is, that it will not be found a successful practice to merely refer the disease to its proper position in the classification of skin affections, and then to treat it by routine; according to what is said to be good in that particular malady in the text-book to which the practitioner refers, or in which he places his confidence. Doubtless he will find there an account of what external measures experience has found to be useful in each form of disease, and allusion to general measures, as tonics, alteratives, and cod-liver oil. But he will easily recognize the fact that this information is of slight value, unless he can see what portions of the general directions apply to the particular case before him. In impetigo, for instance, it is often well to give arsenic internally; but in many cases this will be found inoperative unless at the same time the diet be liberal and cod-liver oil be added. In other cases, repeated small doses of mercury may be requisite, especially if the ailment occur in the subject of congenital syphilis. The external application of mercurial ointment here is probably proper enough, whatever the special form of general treatment indicated. In the out-patients of hospitals the skin affections are exceedingly often the outcome of dirt, squalor, and malnutrition. Cleanliness

and an improved dietary are as necessary to the successful treatment of a number of different skin affections, which are free from any parasitical origin, as in those whose ailments are so causally associated.

§ 194. A large proportion of skin affections are, as the French have long insisted, linked with disturbances of the abdominal viscera, and especially of the digestive tract. Dr. Calcott Fox says:—"There are four organs whose derangement excites or intensifies skin-mischiefs. The stomach, the liver, the kidney, and the uterus. In the vast majority of cases it is rather intensification than excitation that the practitioner has to deal with. First, as to the stomach; of course, if the stomach fails in its work the general health will suffer, and so the skin will be less able to resist disease or to undergo repair; but there is a more direct influence upon cutaneous diseases than this. My own belief is that wherever there is excess of acid secretion, or where the secretion of gastric juice is altered from a healthy standard, there, probably, from the circulation of acridities absorbed by the intestinal tract, cutaneous inflammations and hyperæmias are intensified, as in the case of the simpler erythemas of children, which are thereby produced. But again, stomach irritation, especially in subacute dyspepsia, is reflected to the skin, especially that of the face, and excites glandular or erythematous changes, as in acne and erythema of the face. The face flushes after meals where digestion is badly performed, and an exaggeration of this condition is observed in acne and erythema, in connection with marked dyspepsia. Of course a predisposition to acne, with exposure and irritation of the face by externals, are elements in the cause of acne, but practically, if treatment removes the dyspepsia, the disease often goes. It is not difficult to see that if the face of the patient is predisposed to acne, dyspepsical troubles reflected to the face may actually excite or determine the occurrence of the acne. Pretty much the same may be said, *mutatis mutandis*, as regards uterine irritation in women. It is a matter of very common observation that uterine troubles aggravate erythema of the face, urticaria, and so on. Now as regards the liver. It is needless to give proof of the truth of the statement that 'poisoned blood'—blood, I mean, charged

with any effete products—when passing through an inflamed skin, say that of eczematous persons, or of an urticaria patient, will tend still further to derange the skin of that particular subject; and blood is often charged with bile products, and tends, as in urticaria and eczema, to intensify the inflammatory symptoms, and to retard the cure. This is often seen in children who have white stools and who suffer from eczema. In the connection between phlegmonous or carbuncular inflammation and the diabetic habit, it is possible again to trace the influence of a disordered liver—supposing that to be the organ directly concerned in the production of sugar—on skin diseases. Lastly, as regards the kidney, there are two ways in which this organ may influence skin diseases; the first, by the non-removal of watery fluid in proper quantities, whereby the occurrence of œdematous infiltration is favoured, as is often seen in eczema in the legs of the old; the second, by non-excretion of nitrogenous matters, leading to impurification of the blood, and the circulation of urea, uric acid, and the like, in unusual quantities, through the inflamed or diseased skin, giving rise to increased hyperæmia. The latter happens in psoriasis, eczema, and other diseases. Of course organic diseases of the stomach, liver, and kidney involve functional disturbances, and so far bring about modifications of skin diseases indirectly, as do purely functional disturbances of these organs. From what I have said the reader will have no difficulty in understanding that skin diseases require to be regarded, not only from a purely surgical point of view, as some are wont to assert, but also from that of the physician." This rather lengthy quotation expresses exactly the view it is desirable to impress upon the reader. Of the relation of the skin, and its affections, to the stomach and digestive canal there is no doubt, and our old empirical plans of treatment have always insisted upon attention to the *primæ viæ* in skin affections. Laxatives, alkalies where there is acidity, tonics, regulation of the diet, all are of the greatest importance in the treatment of diseases of the skin. Where there is a cachectic condition, arsenic, some preparation of mercury, or the excellent combination known as Donovan's Solution may be desirable, as well as ferruginous agents. In strumous conditions potash and iron with cod-liver oil are the best measures.

The views held by Dr. Fox as to the general origin of many diseases of the cutaneous system are shared by Dr. John V. Shoemaker of Philadelphia, who in a recent paper on the *Cause and Treatment of Psoriasis* says :—"The disease develops beyond all doubt from some internal derangement. It may be brought into existence by some mechanical or chemical irritation upon the integument, as from a cut, bruise, bite, or blister, but the system, under such circumstances, must be in a condition to bring about the disease. It may develop from any impairment of the system, especially that which produces an interference with nutrition. All diseases which cause an impoverished state of the blood may lead to psoriasis. It is known to follow dyspepsia, anæmia, syphilis, eczema, scrofula, and other diseases which develop the condition of the blood just alluded to. It may also arise from a nervous origin, causing a lack of nutrition to the system. Of all the affections, however, which cause and keep active psoriasis, I know of not any so potent, so active, and so obstinate as rheumatism and gout. Case after case has come under my observation, the subjects apparently enjoying the most robust health, or being weak and anæmic, but with the exception of these opposite conditions calling themselves well. The patients generally have no apparent cause of complaint, except from the deformity, and the trouble with the red patches and scales upon the integument. Examination of patients under such circumstances, again and again, will throw no light upon the history of their case. The organs are said to be all healthy and working properly. A closer observation upon this apparently healthy class of patients will often enable the physician to detect some functional derangement which continues to keep active the chronic inflammation on the skin. As I have just stated, gout and rheumatism, are among the most prolific causes of this disease, and as factors of psoriasis they are very often overlooked."

As to the relation of skin affections with disturbance of, or inaction in the liver and kidneys, one is inclined to hold that the affections of the skin are causally connected with the non-elimination, or excessive presence of nitrogenized matters in the blood. The skin has much to do with the elimination of these matters, and it seems very probable that many of the skin

affections, especially eczema, found under these circumstances, are the direct consequences of this function of the skin. These matters either act as irritants (Dr. Fox's view), or the skin becomes affected by its functional activity in excreting them. In the latter case the skin disease finds its origin in the condition of the blood, laden with waste; and not merely that already existing skin affections are aggravated by the imperfectly depurated blood. As a matter of fact, however, the relief of the internal organs, and especially a reduction in the amount of nitrogen consumed, together with alkalies and chiefly potash, at once relieve these skin affections and often secure a speedy cure. Such are the measures to be adopted for the relief of the terrible itching found in many cases of jaundice, and in the prurigo senilis associated with imperfect renal action. For the latter strong solutions of bicarbonate of sodium applied hot often give great relief. In some disorders of the liver there is an excess of lithates in the urine, and therefore in the blood first, and these no doubt irritate the skin; so that in reality liver disturbance may produce the same consequences as imperfect action of the kidney. In each case the treatment usual in gout will relieve the skin affection—no matter whether it be eczema, an irritable ulcer, or prurigo. Very often alkaline applications, as in eczema, aid the general measures in giving relief. A large proportion of the visitors to such spas as Buxton, Aix-la-Chapelle, Carlsbad, Sarratoga, &c., suffer from skin diseases, and are relieved by the waters, as effectually as are any of the sufferers from the other forms of lithiasis. The habits of the rich lead to certain forms of skin affections, as certainly and surely as the improper food and neglect of hygienic arrangements of the poor lead to other forms. In case of biliary disturbance with lithates in the urine the following will be found very useful as an internal remedy:—

Sodii Sulph. ℈ i.
Sodii Pot. Tart. ʒi.
Tinct. Nuc. Vom. ♏x.
Inf. Buchu, ad ℥i.

or

Decoct. Aloes Comp. ad ℥i., ter in die.

Dr. Shoemaker's views on the treatment of that obstinate disease which we call Psoriasis are so thoroughly practical that no excuse is needed for quoting them at length :—"The treatment to be pursued in any case of psoriasis, depends always upon the exciting cause. The majority of those suffering from the disease will require hygienic measures, together with internal and external medication. The most important hygienic rule to be followed consists in plenty of exercise, especially in the open air, with a judicious amount of bathing, in order that the skin that has been rendered inactive by the infiltration may take upon itself some activity, and thus be enabled to free the system of the morbid products that assist in keeping up the inflammation of the skin. Passive exercise may be instituted and the skin rendered pliant and active by systemic massage. The latter means is most beneficial in chronic cases of psoriasis, by awakening the dormant state of the skin, lessening the thickened leathery condition that follows from long-continued infiltration, and becoming a most useful agent in promoting the activity of the skin and in assisting in relieving and curing the disease. The rule in treating psoriasis is usually to apply some stimulating preparation or dressing to the red and thickened patches until the morbid condition yields to the local application. The glands of the skin, to which the application is thus made, unfortunately often become filled with the substance employed, and the skin, as a result, is rendered inactive, the morbid products yet remaining within, in place of being poured out upon the surface, become in turn active factors in again reproducing infiltration of the integument. Exercise and bathing, with, in very chronic cases, massage, used in conjunction with the local treatment which will be alluded to presently, will not only thus prevent the skin from becoming dormant, but will also restore it to activity, and assist materially in relieving and curing the disease. The hygenic rules just referred to, which are the very best means at the disposal of the physician, are, most unfortunately, in very many instances entirely neglected for the commonly accepted plan of treatment of arsenic and stimulating ointments.

"In reference to the employment of internal medication, cases of psoriasis depending upon rheumatism yield well to either the

salicylates, oil of wintergreen, acetate of potassium, digitalis and the sweet spirit of nitre, quinine, antimony, turpentine and the iodide of potassium. The latter is one of the very best agents for eradicating the disease in rheumatic patients. Grave, Boeck, and Haslund have reported a number of cures from the iodide of potassium in large doses. Again and again have I observed also in many cases the curative action of this drug in large and frequently repeated doses, often from ten to thirty grains being taken every three or four hours during the day. The class of cases, however, in which this drug, in my experience, has been curative has been in those having either a rheumatic or gouty condition of the system. Gouty subjects having psoriasis often do well on colchicum, guiac, the preparations of lithium, and the various alkaline waters. Cases in which the disease owes its existence to a nervous origin require phosphoric acid, oxide of zinc, nitrate of silver, the proto-chloride of gold and sodium, arsenic, and often the addition of galvanism. The anæmic do best upon the preparations of iron and arsenic; and those arising from imperfect assimilation can often be cured by a proper course of dietetics."

§ 195. The association of the cutaneous manifestations of syphilis with the saturation of the system with the syphilitic virus, forms material for a good deal of thought about the relations of skin affections to constitutional conditions. How far the disturbances of the tegument can be regarded as depurative measures calculated to restore the system to its integrity, is a matter about which we cannot at present be certain. There is no doubt that syphilis is much milder in hot countries than in cold ones; indeed, Hebra points out the excellent effects of a sojourn in hot countries over the progress of an attack of syphilis; and also that hot baths are excellent measures during the secondary manifestations of this disease. When there is a good eruption in the secondary stage there is frequently less of remoter consequences than where the eruption is slight and fitful. Indeed it would almost seem that a good crop of cutaneous secondaries eliminates the poison thoroughly and leaves the system freed. The cutaneous outcomes of syphilitic infection are seldom treated by local applications, but by general treatment almost entirely. No one dreams of applying mercury outwardly only, but saturates

the system generally with the drug. In no form of skin disease do we see more practically exemplified the dependence of these maladies upon a general condition, than in the treatment of cutaneous syphilitic manifestations. Of course it is not asserted that local applications are without value; but no one would dream of relying upon them, to the exclusion of the administration of mercury by the mouth, or by inunction over a limited area. In cases of congenital syphilis, where an infant will come out suddenly in almost one sheet of eruption, the treatment is to give mercury internally; and to leave the eruption alone as regards any external applications. In the remoter cutaneous outcomes of syphilis, the application of mercury locally is desirable; but in all cases it is subordinate and ancillary, and thoroughly so, to the general treatment. The lessons taught us by the treatment of syphilitic eruptions ought to lead us to think more exactly about the treatment of other skin affections, and of their connection with general conditions.

§ 196. At other times skin eruptions are distinctly associated with the nervous system. This is most distinctly seen in herpes zoster, which follows closely the distribution of an intercostal nerve, or in more severe cases, several nerves. This form of vesicular disease is not only preceded in many cases by severe neuralgic pains, or pleurodynia, which sometimes remain after all eruption has passed away; but Bärensprung and others have found distinct changes in the nerves going to the part affected. This association of herpes zoster with changes in the nervous system must always be borne in mind in practice; and while the eruption may be treated with starch and other external applications, tonics, iron, and quinine must be given freely, and the dietary must be liberal. If this general treatment be not followed out, not uncommonly the burning, stinging pain will survive the disappearance of the eruption, to the great suffering and annoyance of the patient. Herpes is not rarely found in ague, and is conjectured to be due to some disturbance in the spinal ganglia. It is also found under other circumstances, including the well-known association which exists betwixt herpes labialis and pneumonia, or catarrh. Clifford Allbutt thinks that several other forms of skin disease,

as acne, eczema, lichen, psoriasis, and urticaria, are at times associated with visceral neuroses, and with asthma and gastralgia. He says, "We have learnt that in the higher animals nerve-changes constantly precede changes of other tissues, not only in normal function and in normal growth, but also in abnormal function and abnormal growth." Many of the skin affections are doubtless at times the consequence of interference with nerve-nutrition rather than blood-nutrition; and then it is necessary to take into consideration, therapeutically, this association. At present the tendency is to regard herpes as part of a neurosis only and not the disease itself. A localized neuralgia may occur without the vesicular eruption, which is quite as unpleasant as when the eruption is present.

Pruritis or itching is a constant concomitant of diseases of the skin. Oftentimes the relief of just such a pronounced and tangible annoyance assists in the securement of success on the part of the doctor, more than skill in handling really dangerous diseases. The drugs advocated for the treatment of pruritis are as numerous as the causes, and the general medication can be decided on only after a general study of each individual case. There are, however, certain remedies which may prove beneficial in almost any case. Some of them act chiefly by blunting the sensitiveness of the terminal nerves, such as the tincture of cannabis indica, which can be given in ten-minim doses three times daily, gradually increasing to twenty-five minims. If the pruritis is local carbolic acid is one of the best antipruritics, and Bronson's formula is excellent.

℞ Liq. potass. ℥ij.
Ac. carbol. ℥iv.
Ol. lini. ad ℥ij.
Ol. bergamot, gtt. x.
M. Sig. For external use.

The alkalie softens the skin and removes the dead corneous tissue, while the oily solution of carbolic acid allows the use of a very strong mixture without fear of any corrosive effect.

Where the pruritis is almost universal this lotion is too

strong, and other treatment must be devised. Especially grateful to some patients are lotions containing about ʒj of acetic acid to half-a-pint of water, or about the same proportion of bicarbonate of soda. These can be used as frequently as necessary, care being taken to dry the body without using enough friction to rearouse the skin. In the distressing itching of parasthesia, urticaria, pemphigus and prurigo, Dr. Shoemaker speaks highly of beta-naphthol. It may be used in the form of powder, lotion, or ointment, but he finds the following diluted powder much the most efficacious:—

℞ Naphtholis, gr. xv.
Bismuthi subnitratis, ʒi.
M. For use as a dusting powder.

Another good formula is the following:—

Perchloride of mercury, half a drachm.
Alcohol, two drachms.
Rose-water, six ounces.
Distilled water to half-a-pint.
To be applied cautiously.

§ 197. In consequence of its being our external covering, the skin is liable to injuries and to the presence of parasites. These last are of various kinds, they may be animal or vegetable. Of the first, or animal parasites, there are varieties; there are those which live outside the skin and are visible to the eye—the pediculi; a large class of articulata, which infest all varieties of creatures, fish, flesh, and fowl. There is one curious peculiarity about this objectionable and detested class, namely, that each species of parasite will only survive on its own peculiar hunting-grounds; the parasites of the Lascar will not live on a European seaman, and *vice versâ*. The other and larger visitors, the pulex and the cimex, do not manifest this fastidiousness; still there are persons whom they avoid. Habits of cleanliness are destructive to these last-named parasites, and are hostile to the pediculi; but in the case of

the pediculus pubis it is necessary to solicit their departure by the application of blue ointment, which, if applied effectually, leaves the whole host in the morning dead or dying. There is also another sadly common parasite, the acarus scabiei. Here the insect burrows in the skin and lays eggs along the channel. When the skin becomes vascular, as when exposed to heat, or in bed, then these creatures become specially active, while the vascularity gives greater sensitiveness: the result is intense itching. These animals have a decided intolerance of sulphur, especially in the shape of an ointment; and two or three complete applications of this unsavoury compound is usually sufficient for their annihilation. Dr. Fox recommends an ointment composed of one part of storax and two parts of lard. In all cases the clothes must be subjected to a high temperature in order to destroy the juvenile parasites, who are unusually tenacious of life, whether the eggs of the acarus or the pediculus; and a temperature sufficient to coagulate their albumin is the only parasiticide which can be thoroughly relied upon. Some insect powders are most potent in their effects upon these small parasites. In other cases, as in that of the Guinea worm, the careful extraction of each invader is indicated.

At other times the parasite is a vegetable growth, as in favus, sycosis, and tinea tonsurans. The researches of Dr. Calcott Fox and Dr. Frank R. Blaxall have thrown much light on this obscure subject. Their inquiry into the Pleurality of the Fungi of Ringworm has given an impetus to the study of this difficult question in English-speaking countries which will have a far-reaching effect, and the importance of which it would be impossible to over-estimate. In favus the scabs must be removed by poulticing, and then the hairs must be extracted and a parasiticide applied. The agent of all others destructive to vegetable parasites is sulphurous acid, either alone or in the form of sulphite of sodium. In tinea tonsurans the destruction of the parasite by repeated applications of sulphurous acid is followed by the growth of the hair, which, however, may require some stimulation. Coster's paste, composed of two drachms of iodine and six drachms of colourless oil of wood tar, often proves efficacious. In pityriasis versicolor, the parasite is the micro-

sporon furfur, and it also gives way before repeated washings, first with soap and then with vinegar, and the use of sulphites; but its most ready departure is induced by Goa powder, rubbed on with the finger in a little water; indeed the effect of Goa powder would seem almost magical. A curious form of disease connected with vegetable parasites is the Madura foot, or fungus foot, of India. The destruction of the foot so produced is such that amputation alone affords any substantial relief. This ailment is found only in certain localities, and in this respect resembles the Delhi boil and Pellagra, or Italian leprosy, which is due to eating maize which has become unsound or, rather, mouldy. Maize so changed produces skin affections in horses and fowls as well as man.

At other times vegetable growths, and especially oidian forms, locate and flourish on mucous surfaces, as in the aphthæ or thrush, which forms in the mouth and on the fauces of debilitated infants; and which also finds a suitable home in the vaginal mucous membranes of neglected little girls, or of diabetic women. In the latter case these fungi keep up the discharge, and their destruction by sulphites is a necessary step towards the cure of the malady. The following injection will be found useful:—

℞ Naphtholis, gr. v.
Glycerine, ʒi.
Agam, ad ʒv.

The whole treatment of diseases of the skin of parasitic origin is curious and special, and contrasts with those of constitutional origin in that external applications, often of a very special character, are the chief measures to be relied upon, and the general measures are quite subordinate; while in the other class of skin disease, general treatment, often of a special character, as mercury in syphilis, is the great matter, and the local applications are comparatively unimportant.

§ 198. One of the most curious and yet universal of skin affections is the corn. Few people who walk much are free from these growths. Their causation and growth are matters of practical interest, furnishing hints for their prevention or removal. They usually—that is the hard corn at least—appear at

points exposed to friction, or to pressure. A growth of epidermal scales follows, like the growths on the labourer's hands, with this difference: in the latter case the thickened epidermis rises from the surface, and so protects the parts beneath, while it enables the hand to take a firmer grip; but in corns the surface is kept flat by the pressure, and so the epidermal growth is pressed inwards into the sensitive skin. There are two ways of getting rid of corns when established. One is to apply a saturated solution of sulphate of zinc to the mass until it is so dry that it peels off; the other is to dig out the conical mass with its little nutrient artery and vein, called by the vulgar "the root." By either plan the growth is got rid of; but if the pressure be still there the corn will grow again. The ordinary "Corn Solvent," which is a solution of salicylic acid coloured with tincture of cannabis indica, applied night and morning, will usually effect a cure. Well-fitting, even tightly-fitting shoes of soft leather are indicated; by having them to fit closely the pressure is spread evenly over the whole foot; while if large, loosely-fitting shoes are worn the pressure necessarily falls on a few points. Relief may also be obtained by corn plasters, which are perforated circles, and are applied so that the corn may rise up in the central hole; and thus the tender part under the corn be relieved from pressure. A few weeks in bed, from any cause, is followed by relief from corns for a long while after. If the pathology of corns were only more thought over, they would be found much easier to remedy than is at present the case.

Another troublesome skin affection is the wart. Not the congenital wart of the face, but the wart which flourishes on the hands of growing children. This growth usually passes away when adult life is attained, but this is not always the case. The most effectual plan is to touch them with strong acetic acid, or strong ammonia, which soon destroys them. The liquor arsenicalis is a good application. The secret of success, however, does not lie so much in the peculiar form of the different applications in favour, as in the method of applying them. The fluid should be applied with a glass rod or stick, so that half a drop or so of the fluid may be located on the wart. The hand should be so held also that the fluid can dry without running off. If too much be applied the fluid runs off, doing

little or no good, and only irritating the skin around. If applied properly, warts can be destroyed most effectually by acetic or other acid, or strong ammonia.

§ 199. The skin is liable to solutions of continuity, or breaches of surface, known as ulcers. It is difficult to say anything briefly which is of any value about these maladies. They are essentially surgical matters, and require very special treatment; nevertheless, there are points about ulcers which come under the physician's province. A sore, or ulcerated surface, may arise from almost any form of skin affection in debilitated constitutions, especially if much scratching has been practised. Such ulcerations are best met by tonics, by cod-liver oil, and good food. Occasionally arsenic, or mercury, may be given with advantage. Of the ordinary ulcers there are several varieties. One is an indolent form, where the raised edges of epidermal scales do not furnish ready growth. Here the removal of the thickened epidermal layer, by the application of a blister, is followed by renewed growth and formation of cicatrix. If there be a somewhat large surface to heal over, bringing the edges of the ulcer a little nearer together by strapping the leg, so as to take off the tension, will often induce further cicatrization. The discovery of transplantation has done much for the treatment of large ulcers. Rest in bed is in most cases essential. The so-called "oxygen treatment" has nothing to recommend it. Good food, iron, fats, rest and warmth for the limbs, all are useful adjuncts. Sometimes the ulcer is very painful, and then it is termed an irritable ulcer. Here there is often a network of nerves at the base of the ulcer, which are very sensitive and interfere with repair. Their section with the knife gives relief and institutes repair. This is well known in fissure of the anus. At other times irritable ulcer is connected with lithiasis, and then it must be met by constitutional rather than local measures. When there is much standing, the veins of the legs are apt to become dilated or varicose. An ulcer forming under these circumstances is very troublesome; but for the measures required for its relief the reader must consult some surgical treatise. There are minute attentions to details required, which do not enter into the scope of this work. In all cases keeping the skin warm is

a matter of moment. The exposure of the legs to cold is as much a cause of ulcers as is their dependent position, and both these factors must be taken into consideration in any plan of treatment. Old persons often have ulcers from burning their shins before the fire.

At other times the skin, and especially that of the face, is liable to a persistent change in limited areas. Lupus is the term applied to this malady. It may, or may not, go on to ulceration. If an ulcer forms, nitrate of bismuth ointment is often useful. If the ulceration be persistent until a condition not unlike a cancerous sore is induced, then escharotics are indicated. If there be no ulceration, and but a disfiguring blotch exists, it may be removed by caustics. Any one who has seen Hebra proceed to attack lupus must be convinced of the necessity for active measures. He first energetically rubs caustic potash on the epidermis of the mass. Then he removes the loosened epidermis with charpie, and having thus exposed the morbid growth, he applies lunar caustic in stick. As he remarks, it is of no use to apply the nitrate of silver until you have reached the disease and tissue itself.

Finally, skin diseases and their treatment must be learnt by actual practice; and arrangements are now made in all our schools for their teaching. At the same time there is much to be done by rational therapeutics even in this domain, specially ruled over, though it be, by empiricism. Even in the matter of a scratch it is well to shave down the raised edges with a razor, so as to take off the projections which are sore to any touch; and by so removing them, and thus putting the parts at rest, the scratch heals more kindly.

A word, however, about fœtid feet. This is a very troublesome affection with some persons, and persists in spite of great personal cleanliness. It is most common in young people, and especially in young women. The decomposition is due to the presence of a bacterium, which may be cultivated, although few people find it desirable to do so. Of the many plans of treatment in vogue, there is none more successful than that of washing the feet with soap and water night and morning, and then swabbing them with a strong solution of sulphite of soda, about an ounce to the quart of water. A one per cent. solution

of formalin will often remove the fœtid odour in the course of a few hours. Salicylic acid plaster is also useful. If this be accompanied by the changing of the socks, so that the same pair be not worn two days consecutively; and a similar arrangement be made with the shoes, taking care during the time they are not worn to expose them freely to the air, and still more to the sun; together with attention to the general health, and especially to the bowels: this repulsive affection may usually be treated successfully. When the feet are always bathed in perspiration it is well to apply a solution of sulphate of atropine.

The insides of the socks and boots should be dusted freely with powdered boracic acid or salicylic acid.

CHAPTER XX

THE LYMPHATIC SYSTEM

§ 200. This system is one of much importance; but it is one on which we do not yet possess a sufficient amount of information to be very explicit about the *rationale* of much of which we are assured by our every-day practice. When there is an enlarged thyroid gland, a periosteal node, or an effusion into a serous sac remaining after an acute inflammation, we resort to iodine, with or without mercury; in order, as we say, to rouse the lymphatics. We all know that by these means we shall be able to remove, more or less completely, the abnormal matters. Early in the use of iodine it was asserted that the testes and the mammary glands were not unfrequently removed by the unusual absorption excited by the use of this agent. Nowadays we do not hear of these occurrences.

The system of lymphatics, by whose agency these ends are brought about, is a widespread system. It consists of multitudinous tubules extending over the limbs and permeating the tissues, which, at the axillæ and groins, have placed upon them glands, possessing, among other properties, a species of filtering action; after passing into the trunk the glands become more numerous, and the lymphatic vessels of the lower extremities open into the receptaculum chyli; and joining their contents to those of the chyliferous glands, the common fluid is poured into the venous system by means of the thoracic duct. The lymphatics of the left upper extremity and left side of head unite with the duct as it opens into the left subclavian vein. The right lymphatic duct, containing the fluid brought from the right arm and head, opens into the right subclavian vein. Such is the

anatomical arrangement of the lymphatic system. Why there should be collections of glands on the lymphatics at certain points, as the glandulæ concatenatæ of the neck, is yet unknown. Researches have shown that these lymphatics are evolved from mere spaces in the connective tissue of the body, which have become elaborated into a distinct system of vessels with definite coats, and an arrangement acting like valves. In reptiles there are pulsating sacs in this system, denominated lymphatic hearts. More recent researches have shown that the great serous sacs, the peritoneum, the pleura, the pericardium, and the arachnoid, are not merely smooth lubricating surfaces, admitting of movement without friction, but further are lymph spaces in intimate connection with the lymphatic system. There are also lymphatics in the sheath of each arteriole.

So much for the anatomy of the lymphatic system. To be equally brief, the physiology of this system is as follows:—It is by means of this system that the excess of nutrition to various parts of the body is restored to the general circulating fluid; instead of being wasted, or producing local anomalies of nutrition. Nutrition is furnished to the different parts of the body by the arteries, and still more intimately by the capillaries, from which last the nutritive fluid actually escapes. Some of this fluid passes back into the venous portion of the capillaries, another portion is taken up by the lymphatics. During this process the fluid has parted with some of its nutritive material for the support and repair of the tissues; and on the other hand has taken up the waste of these tissues. Part of the tissue-waste then passes away in the fluid which finds its way into the veins, the other part is carried off in the fluids of the lymphatics. In either case along with the waste there is much nutritive material; which is thus carefully economized and utilized to meet the needs of the system. It is obvious that in health, a balance must exist betwixt the supply of pabulum to the tissues and the removal of the excess remaining over after their wants are supplied. The arrangements for maintaining this balance are curious and interesting. They resemble, indeed, pumping arrangements. When a muscle is in great functional activity there is a free supply of blood to it, and the liquor sanguinis passes freely through its structure, supplying its wants and

removing the waste; upon whose presence the sensation of fatigue depends. There is a much freer supply, indeed, than is the case in rest, and this extra supply passes off by the lymphatics in the sheath of the muscle; while the alternate contractions and relaxations of the muscle exercise a species of pumping action, by which the passage of the fluid in the lymphatics of the fascia is accelerated and aided. In the peritoneum the diaphragm acts as a pump, and the stomata found on the under surface of the diaphragm are the open mouths of lymphatic ducts, into which the fluid is forced. Similar stomata exist in the costal pleuræ, and every act of respiration—in one respect—resembles the stroke of a pumping-engine. Such are the arrangements by which the nutrition of the system and the removal of waste are accomplished; the arteries supplying the nutritive fluid which finds its way back into the blood-current by means of the veins and the lymphatics.

§ 201. *Theory of Absorbents.*—These lymphatics remove in a great measure the excess of nutrition, laden as it is with tissue-waste. When there is a disturbance in the equilibrium normally existing betwixt supply and demand, excitation of the lymphatics will tend to restore it. Such is the theory of absorbents. By means of iodine in its various forms, the most distinct and powerful absorbent with which we are acquainted, we excite the lymphatics into greater activity; and so reduce various tissue enlargements, especially such as consist of certain forms of connective tissue. Locally applied, too, these agents act powerfully, especially in connection with glandular enlargements. Thus in enlargements of the thyroid gland, especially those known as goître, or bronchocele, the hypertrophy is removed by the use of iodine in many cases. If, however, the enlargement is due to a cyst, or if it consist chiefly of enlarged blood-vessels, iodine is of little use. But if it is composed of adenoid elements, iodine is efficacious. When there is an accumulation of fluid in the great lymph spaces after inflammatory action, iodine is very useful. In the static accumulations of fluid in these spaces, from venous congestion due to cardiac failure, absorbents are useless; the disturbance of the circulation is too profound to be affected by acting on

the absorbents alone. If the heart can be stimulated into greater activity, and the balance of the circulation be somewhat restored, then absorption may once more take place efficiently. In those perversions of nutrition in the direction of excess, such as we see in the periosteal node, iodine is very useful; but, as is well known empirically, it is of no avail to resort to iodine so long as there is much vascular activity in the part. As long as such activity exists it is useless to stimulate the lymphatics; the disturbance of balance in nutrition is not at that period to be remedied by acting upon the absorbents. But when the vascular activity has passed away, and the nutrition of the part has become once more somewhat normal, then iodine may be used with advantage; very frequently the absorption is very rapid, and a normal state of matters is once more reinstituted. Thus we can see the how and why of what empiricism has taught us. The action of the absorbents upon various forms of tissue is interesting and instructive. Over normal tissue they exercise but little effect; but over neoplasms they exert more influence. There is much difference in the neoplasms, however. Malignant forms of connective tissue are in no way affected by absorbent remedies. Cancer defies such action of the lymphatics. Ordinary growths of connective tissue, like fibroid tumours, resist the action of absorbents. But rapidly-growing masses of young connective tissue cells, such as we see in gummata and other syphilitic growths, are readily removed by means of these absorbent remedies. Nodes, gummata, growths in the nervous system, disappear under the exhibition of iodine.

There is, however, one important matter in connection with the removal of these neoplasms by the use of absorbents, and that is the effect of mercury. Probably mercury acts upon the lymphatic system directly, standing in that respect next to iodine. But mercury has another action, which in the removal of such growths is most important, and that is its destructive action upon new growths. John Hunter of old, thought and taught, that mercury acted upon abnormal and diseased parts with much energy, while it affected but little the healthy structures. There is a great deal in this, really and actually. Mercury does break down such growths, and

the detritus is removed by the lymphatics. Especially is this the case where the syphilitic neoplasm is in intimate relations with lymphatics, or a lymph space. Witness the effect upon a syphilitic tubercle in the iris, produced by the administration of mercury. The anterior chamber of the eye is a lymph space, and under the effects of mercury this growth can be seen to melt away rapidly and thoroughly.

By the combination, then, of mercury, to break down structurally neoplastic growths, and iodine to stimulate the lymphatics, we can remove much excessive or perverted nutrition; which may be objectionable, either from the pain it produces, by the pressure it exerts, or from the abolition of nerve-function which its presence may induce by pressure, or compression of some part or portion of the nervous system. Such is the explanation, so far as the present state of our knowledge will permit, of the effects of iodine and mercury upon the glandular and lymphatic systems.

We have long ago abandoned the idea, that by the use of iodine we can remove either hypertrophic muscular fibre, or the products of slow progressive parenchymatous inflammations. The reduction of hypertrophic enlargement of the heart by the use of iodide of potassium, which so moved our immediate predecessors, is now no longer thought attainable. That the hypertrophy, or rather its prominent objective phenomena, was removed by a course of iodide of potassium, combined with low diet, is intelligible enough. We have seen that most of the cardiac hypertrophy, unconnected with valvular lesions, is associated with a lithæmic condition, and the removal of waste nitrogenized matters by these means would lead to a lower arterial tension, and so relieve the left ventricle: and then the objective signs of hypertrophy would pass away, and only a slight increase of bulk, no easy matter to determine even by careful percussion, would remain; just as the hypertrophy of pregnancy passes away after parturition. But we know well enough that this change did not, and does not occur by any action of the absorbents upon the muscular structure of the heart itself. In the same way the lymphatics are unable to remove the products of slow parenchymatous inflammations; and the recommendation to use iodurctted

frictions in valvulitis, in order to remove the connective tissue which has distorted the valves of the heart, though met with even in some recent works, indicates, not faith, but credulity. We now know that such statements are but the remains of that belief in the wonderful potency with which iodine was credited on its first introduction. In this respect iodine differs not in its history from that of other potent agents; the miraculous powers which are at first attributed to them, settle down in time into a sober estimate of the real value of each agent; and if iodine is unequal to procuring the reduction of a hypertrophied heart, or the restoration of crippled and injured valves, nevertheless it is an agent whose potency over young connective tissue growth (of syphilitic origin especially) no one would think of disputing.

As to the practical application of iodine little need be said. It is usual to prescribe it in the form of iodide of potassium in doses of from five grains up to half a drachm, or even a drachm, three times a day. It is also applicable in the form of an ointment or a liniment of iodide of potassium in compound soap liniment, or in camphor liniment. Many add liquor hydrargyri bichloridi to the mixture containing iodide of potassium, so as to produce a soluble biniodide of mercury. At other times the mercury is used as an inunction along with the iodine mixture, or is given in the form of a pill, chiefly at bed-time.

Such is the action of mercury and iodine in the reduction of abnormal growths; and a little experience will soon convince the student of their potency, if they be used in a suitable form of morbid product. If given in unsuitable cases they fail; but that is not any fault of theirs. The extraordinary effects of such combination upon the secondary eruptions of syphilis can be accounted for by the richness of the lymphatics in the vascular skin; while the mode of action of mercury and iodine will readily explain to us their potency in the treatment of those affections of the skin, not being syphilitic, which take their origin in excess of nutrition. The local application of mercury and iodine aids in the effects produced by their internal administration.

Dr. Arvid Kellgren, as the result of an elaborate experimental

research conducted in the Laboratory of the Royal College of Physicians of London and the Royal College of Surgeons of England, has shown that massage affords a sure and effective means of increasing the rapidity of the absorption of substances injected, either subcutaneously into the muscles, into the articulations, or into the great serous cavities. The course which the injected substances follow during the absorption is always that of the nearest lymphatics and the glands into which they pass.

§ 202. The lymphatics are liable to acute inflammation. This usually occurs from some injury, especially a poisoned wound; or it may arise from suppuration in a debilitated system, or one temporarily in an unhealthy condition. In these cases the lymphatics become inflamed by the material they have taken up. In certain forms of dissecting wounds the lymphatics become most gravely affected, and though usually the peccant material is arrested at the first gland, which acts as a filter, in such cases there is, not rarely, a general infiltration of the areolar tissue on the affected side of the body, general blood-poisoning, and death. In the case of soft chancre, there is absorption of the poison by the lymphatics of the penis, and arrest at the first gland, causing that suppuration known as the "bubo." There are two points then to be attended to in the ailments of the lymphatic system, and these are the treatment of the inflamed lymphatics, and the treatment of the affected glands. Ere mentioning these varieties of local treatment, it may be well to insist upon the lines of treatment to be pursued for the system generally. In cases of blood-poisoning by absorption, it is of the utmost importance to protect the system at large, and for this purpose it is usual to resort to antiseptics, often combined with tonics. Thus

Pot. Chlorat. gr. xv.
Inf. Cinchonæ, ℥i.

every four to six hours, with or without five grains of carbonate of ammonium, or ten drops of tincture of steel, is an excellent measure. Others rely on the sulphites of sodium, either alone or with chlorate of potassium, with liberal quantities of wine.

After the brunt of the attack is over, and there remains a condition of debility combined with an amount of putridity, the chlorate of potassium may be combined with the tincture of perchloride of iron. As regards the local treatment of the inflamed lymphatic, the pink ribbon it forms on the skin may be painted with nitrate of silver with advantage. If there be any local sore, or abscess at the periphery of the limb, this ought to be cleansed thoroughly with solution of permanganate of potassium, or carbolic or salicylic acid; and if irritable poulticed, charcoal being dusted over the surface of the poultice. When a gland is affected, it is undesirable to attempt to arrest the process of suppuration—a plan not undesirable under some other circumstances—but to poultice it, and lay it freely open as soon as fluctuation can be felt.

§ 203. The glands are liable to be affected by acute and chronic diseases. The acute form is found under the circumstances just referred to, but is most commonly the consequence of absorption of syphilitic poison from a soft chancre. In the latter case the attempt to induce resolution by painting the gland with iodine is rarely successful; and only renders the skin harder, and so increases the necessity for the use of the knife. When an inguinal, or other gland is inflamed from mere irritation, as in the case of the bubo found with gonorrhœa, then it may not be undesirable to attempt resolution.

At other times the glands undergo a more chronic form of suppuration, requiring its peculiar treatment. If the patient be scrofulous, no local treatment alone will affect the glands, and it is necessary to attend to the general health; to give iron, best combined with alkalies, and cod-liver oil with a liberal dietary. All drains upon the system must be looked to. Often a change of air to the country, and still more to the sea-side, is necessary. In other forms of chronic enlargement of glands, the use of iodine, and especially in combination with mercury, is indicated. Not rarely pressure by strapping, or otherwise, is useful.

§ 204. The great lymph spaces, the serous sacs, are commonly the seats of acute inflammation. Of old it was the practice to bleed freely under such circumstances; and where there are not many other appliances at hand, this is a practice which may yet be resorted to with advantage. In most cases, however,

it is well to depress the circulation by other means, as by antimony, or aconite. By so reducing the vascular tension, the hyperæmia may be affected in the inflamed part, and one element of the inflammation at least be somewhat controlled. At the same time opium must be administered freely. There are no longer two smooth and well-lubricated surfaces gliding pleasantly upon each other; but two dry, highly vascular surfaces, whose friction upon each other is exquisitely painful. Consequently opium in full doses is indicated. It not only affects the terminal fibres, and so lessens the actual pain of the friction; but by its action upon the nervous system, deadening conductivity, and also lessening the sensitiveness of the nervous centres, it relieves the system from the effects of the pain. Such should be the plan of treatment of simple inflammation of a serous surface. If it is more specific, as in lithiasis or uræmia, two common causes of inflammation of serous surfaces, then the treatment must be directed to the general condition; and such a plan will be found most efficacious in the relief of the local ailment.

The local measures to be resorted to are such as reason dictates. In the case of the pleura and peritoneum, their parietal layers are fed by arterial twigs arising from the same trunks as the twigs which supply the skin; this is most clearly seen in the cutaneous and pleural twigs of the intercostal arteries. If the circulation through the cutaneous branches be increased, the blood-supply to the serous layer below will be diminished. The application of hot poultices or flannels to the skin effects this end nearly as well as if the surface were covered with leeches, after the old-fashioned plan. Free circulation through the cutaneous branches, or local bleeding by leeches, gives much relief to the inflamed serous surface beneath; and by such means, and the free administration of opium, with some depressant, much relief is usually afforded. If peritonitis is the consequence of rupture of the intestine, of an abscess, or of an ovarian cyst, no treatment short of a surgical operation will be efficacious; but relief at least can be afforded by giving opium freely, and so better euthanasia permitted. The exhibition of opium in large doses in all serous inflammations, except those of renal origin, is distinctly indicated. As a rule

these inflammations are not fatal, and it is very desirable that the painful stage be undergone in a state of more or less perfect anæsthesia. The suffering may just as well be avoided as not.

In many cases such measures will be found efficient; but in other cases effusion takes place, as it is said—in reality the fluid poured out into the lymph sac is not absorbed again as quickly, and so accumulates. The fluid is useful in so far that it keeps the two inflamed surfaces asunder, and relieves them from further friction. When once there is fluid poured out, as we say, the active symptoms cease; and then we are left to engage and disperse this fluid, which infringes on and diminishes the thoracic space. The problem we have then to solve is the getting rid of this fluid; and for this end we usually resort to the internal administration of iodine, with small quantities of mercury. The local measures in most repute are blisters applied around the thorax, first one, and then, in a day or two, another. These produce a flow of blood to the cutaneous surface, and diminish the blood going to the serous surface beneath; and, by so lessening the vascular supply, permit of the absorption in the lymphatics taking up some of the accumulated fluid. In fact by checking the vascular supply, and with it the effusion of lymph, the absorption going on is able to reduce the bulk of fluid;—the absorption being then in excess of the outpouring. The blisters are to be repeated until a steady increase of the absorption over the influx is instituted; after that is established matters soon become normal again. If the fluid remains but little affected, it is well to remove some of it by the aspirator, after which absorption will usually set in. If the fluid is not removed at a comparatively early date, the lung is apt to be bound down by adhesions to the costal pleura; as the fluid is absorbed the chest-wall shrinks. As soon as the chest-walls begin to fall in, the opportunity for successful treatment has passed away—usually never to return.

If the pleuritis has resulted from a broken rib, it is obvious that the treatment of such a case, *par excellence*, is to put the parts at rest by limiting the movements of the fractured rib. This can be effected by putting on a form of corset, and lacing it tightly. These are the only circumstances under which tight

lacing is permissible. At the same time opium or some other analgesic may be exhibited with advantage. In the same way if the pleurisy be the result of a tubercle of the lung immediately under the surface of the visceral pleura, irritating the costal pleura; putting the parts at rest by checking the thoracic movements, and leaving the respiration for a time to be purely abdominal, is the plan to be adopted. In fact the acute ailments of the serous membranes demonstrate pretty distinctly how far medicine can be rational with advantage; and also how much aid physiology can afford to practical medicine.

§ 205. The more chronic and passive accumulations of fluid in the serous sacs are troublesome matters to deal with. The mere passive accumulations are most commonly seen in an acute form during scarlatina; and purgatives and the warm bath usually procure the speedy absorption of these fluids. In a more chronic form they are usually the accompaniments of a failing heart, with or without renal complications. In ascites, where there is accumulation of fluid in the peritoneum, purgation, free and repeated, followed by stimulating diuretics and above all tapping, is the best method of giving relief. Often ascites is the consequence of an obstructed portal circulation, due to cirrhosis of the liver. It may set in and be stubbornly persistent until the hepatic veins become inflamed, as not uncommonly happens in advanced cirrhosis. Under these circumstances all treatment is but palliative, and the condition does not admit of cure. At other times the ascites is due to some localized inflammation of the peritoneum, and yields readily to treatment.

The function and anatomy of the lymphatic system is of importance practically, and must be borne in mind in a large class of diseases whose connection with the lymphatics is not always at first sight very apparent.

For much of our knowledge of the pathology of the lymphadenoid structures we are indebted to the painstaking researches of Mr. Walter Spencer, Surgeon to the Westminster Hospital. The organs composed of lymphadenoid tissue are the bone marrow, the spleen, the thymus, and the glands and follicles in the mucous membrane of the alimentary and respiratory canals, but new formations may also appear in connective tissue where normally there is little sign of it. Lymphadenoid

tissue is a specialized kind of white fibrous tissue in the meshwork of which free cells collect. These cells produce blood corpuscles and also retain the fundamental digestive powers of unicellular organisms. In consequence of the situations in which lymphadenoid tissue is developed, waste products of tissue change are prevented from entering the circulation until they have been rendered harmless, and thus its function of protecting the body from waste products—metabolites—of normal origin is capable of extension and is thus able to offer some resistance to the spread of disease, either by counteracting the poisonous substance resulting from diseased tissues or by actually destroying the germs of disease themselves. The pathological conditions to which lymphadenoid tissue is itself subject arise in the course of the performance of the protective functions. Being excited to over-action, lymphadenoid tissue becomes the starting-point of new growth, or it is replaced by scar tissue as a consequence of inflammation, so that the production of the red and white blood corpuscles is disturbed and the rest of the body thereby affected.

As Mr. Spencer has shown, lymphadenoid tissue is produced —(1) as lymphatic glands around the plexus of lymphatic trunks where they join in the axilla, groin, &c.; (2) around epithelial masses and glands, as the tonsils, thymus, salivary glands, and intestinal follicles; or (3) in the wall and sheath of the small blood-vessels in the spleen and bone marrow, favoured by the slow rate of the circulation. Fibrous connective tissue is changed into retiform tissue by a splitting up of its individual fibres, and into the meshwork so formed white cells emigrate from the capillary blood-vessels, and there, by multiplying, establish germinating centres. Fine capillaries permeate these germinating masses, but not so the lymphatics. The latter begin in a sinus outside the follicle, into which the young cells pass as they are pushed out from the centre by still newer formations.

CHAPTER XXI

THE NERVOUS SYSTEM

§ 206. The functions of the nervous system are such as to render it liable to many maladies of various kinds, and of different characters, especially as to severity. Some of its derangements are sources of much discomfort rather than anything more; while others are fatal to life in the highest degree. The successful treatment of these maladies, that is of such of them as permit of treatment—and these are the majority—involves much reflection, and the application of physiological knowledge to a very marked degree. Thus in apoplexy—whether it be from rupture of a vessel, embolism, or sudden acute cerebral anæmia—most varied conditions, but often resembling each other with a closeness which only permits of their being distinguished by a specially trained observer—the treatment involves a certain fulness of knowledge to be really successful. In diseases of the nervous system, distinct and well-defined diagnosis is of the greatest importance, and yet this can scarcely be touched upon here for various reasons. Upon certain matters which are parts of a diagnosis, or rather a part of the data upon which a diagnosis is built, depends the line of treatment to be adopted. If the apoplectic patient is found to have a full, well-sustained pulse, a hypertrophied heart with forcible impulse, it is probable that depletory or depressant remedies are chiefly indicated, and best of all, their combination; while if the apoplectic symptoms occur in a poor old creature with a very feeble circulation, it is probable that the condition is one of acute cerebral anæmia, where restoratives, to be followed by tonics, are indicated. So too in epilepsy, it is a matter of much importance

to discover if the attack, or series of attacks, be associated with some distant irritation, as a load in the intestinal canal, or due to central instability merely; in the first case an effectual purgation would be indicated, in the second case such treatment might be injurious. So too in neuralgia, a very decidedly different treatment is indicated in the neuralgiæ of young people, depending as they mostly do upon defective nutrition of the nerves, either from insufficient food or over-taxation of the system generally; and in the neuralgiæ of advanced life, which are mostly gouty or degenerative. In the first, good food and tonics are to be given freely; in the latter a poor diet with eliminant measures would commonly be required; in both, however, there might be an equal necessity for the liberal consumption of fat in any of its forms.

In the consideration of the nervous system, one important fact must ever be borne in mind, and that fact is its high vascularity. Not only is the supply of blood-vessels unusually large, and their calibre comparatively great, but the flow of blood through the brain is rapid and impetuous. Though the brain of man is but one-fortieth of his weight, one-fifth of the whole bulk of blood passes through it. Not only is the amount of blood in and passing through the brain very large, but there is also a great difference between the vascular condition of the encephalon in sleep and in great functional activity of the brain. The amount of activity in an organ is in direct proportion to its blood-supply; and paresis of all the cerebro-spinal system, even including that of the medulla oblongata itself, is readily produced by cutting off the blood-supply. In sleep the brain is comparatively anæmic, and the flow of blood is large and swift. These changes in the calibre of blood-vessels are permitted by the perivascular spaces, or tunnels in the nervous structure, along which the blood-vessels run. A serous fluid fills these spaces when the blood-vessels are contracted, when they dilate the fluid is absorbed, probably by the lymphatic which accompanies the artery, and the vessels fill their tunnels. By such arrangement the amount of blood in the brain varies without compression of the nerve-structure. The brain is also fed by two sets of vessels on each side. The cerebellum and the posterior, or occipital cerebral lobes, are fed

by the vertebral arteries; while the anterior and parietal lobes are supplied by the carotids. The parts at the base of the brain are furnished with blood from all four arteries by means of the circle of Willis. These latter parts are thus protected in the most complete manner possible from conditions of pronounced anæmia, which would be fatal. It may, however, be seriously questioned if the anastomoses of the circle of Willis are equal to maintaining functional activity in the hemispheres; though they do maintain respiration, by keeping the medulla supplied with blood. A glance at the distribution of the vessels over the under-surface of the brain will at once demonstrate how admirably the different structures at the base of the brain are fed with arterial blood; and the richness of that supply, not only as an aggregate, but in the numbers of vessels also; so that the blocking-up of one is of comparatively little moment. The pia mater is very rich in blood-vessels; and from it pass myriads of little arteries into the cortical substance of the brain, where lie the cerebral cells which are functionally so important. The grey matter, the active part of the brain, is more liberally supplied with blood than is the white matter.

The relations of the cerebral cells to their blood-supply are interesting. There is no doubt that a well-sustained blood-supply to the cerebral cells is a necessary factor in active or long-sustained thought; and that on warm, moist, relaxing days, the cerebral activity is much diminished, no matter how strenuously the will determines that action shall prevail. The opposite effect of cold, bracing weather in producing a sense of energy and of fitness for exertion is well known. The amount of blood in the cutaneous vessels affects the blood-pressure, and with it the amount of arterial blood in the encephalon,—perched as it is at the top of the vertebral column. In persons of the nervous diathesis, where the nervous system is comparatively excessively developed, and the brain bears an unwonted large proportion to the general bulk, mental labour under unfavourable circumstances and surroundings is much more possible than with persons of other diathesis. The inhabitants of India are largely of the nervous diathesis; so are Arabs; and we know how comparatively active, both physically and mentally, these creatures

are under tropical heat, to those of a different type. The greater the brain in proportion to the body-bulk, the greater its power; the richer the blood-supply the greater the activity; *cæteris paribus*, the larger (comparatively) brain has it; *cæteris paribus*, the more active the vascular supply, the greater the functional activity.

In the treatment of affections of the nervous system, we find then that there are two methods of acting upon the cerebral cells, either directly by neurotic agents, or indirectly through the circulation: often the two measures are to be combined. Neurosal sedatives are more or less vascular depressants; and nervine tonics also tend to raise the blood-pressure. The affections of the nervous system, however, are not to be approached from their vascular side only—that would be very absurd; but this means of affecting them must never be forgotten or neglected.

§ 207. *Hyperæmia.*—Hyperæmic conditions of the brain are very common, and mostly so in acute pyretic affections, and in forms of insanity with brain activity. As a more permanent form, great cerebral hyperæmia is often found in those who persistently work to excess with their brain; especially if there be also a condition of cardiac hypertrophy with high arterial tension. Hyperæmia of an organ means, really and truly, not merely a large amount of blood in that organ, but a large amount of arterial blood passing through it. Thus passive or venous congestion of the encephalon belongs rather to cerebral anæmia than hyperæmia.

Cerebral hyperæmia is found in maniacal conditions, in exalted conditions, and the delirium of acute pyrexiæ. There is an excited condition of the cerebral cells, in which they attract an unwonted supply of blood to themselves; and this increased blood-supply maintains the cell-activity. But the alteration in the cerebral cells here forms the starting-point, and the hyperæmia is secondary. In addition to the exciting cause, whatever it may be, whether a naturally unstable equilibrium, exciting circumstances, or an abnormal condition of the blood itself, there is often another factor, and that is the increased temperature. The hotter the blood and the brain, the more the cerebral functions are disturbed; while in great cold there

is abolition of brain function. Consequently refrigerant and cooling measures are ever indicated in cerebral activity with a high temperature. Not only general measures, but the local application of cold is very useful. Then there are nerve sedatives, by which nervous action may be lowered. Chloral affects the nervous system generally, as well as exerting a powerful influence upon the circulation. Bromide of potassium acts readily upon the nervous system, and to some extent affects the circulation. These two agents then could be given in cases of cerebral activity, together with opium; or combined, with or without it. If the circulation is pretty quiet opium, from its action upon the nervous system, is indicated; and by combining it with the other two remedies mentioned, a certain and effectual action is produced. Thus are ordinary states of excitement, or of insomnia—often due to cerebral hyperæmia solely—to be met.

When there is a pronounced condition of hyperæmia, as in meningitis, then direct vascular depressants may require to be added. Before the days of chloral and bromide of potassium, opium in small doses, together with full doses of such a vascular depressant as tartar emetic, or maybe venesection, was the plan in vogue; local depletory measures also being practised. An emetic of antimony generally lowered the inflammatory changes; or a full bleeding was performed, and then repeated doses of antimony kept the circulation quiet. Nor were such means at all badly adapted for attaining the end in view. If practised thoughtfully and judiciously, great and pronounced good resulted from such measures. Often doubtless these measures were abused; and the abuse commonly arose from the treatment being too purely empirical, and because the practitioner thought too little of the *rationale* of what he was doing. By keeping the two factors of cerebral hyperæmia clearly before the mind's eye, the treatment will be guided and directed to what is required. When the circulation is effectually quieted, the pure narcotics may be given to procure sleep. As long as the circulation remains active, vascular depressants must form an essential part of the programme. Thus in actual practice in moderate hyperæmia, something like the following prescription is indicated:—

Pot. Brom. gr. xx.
Chloral Hydrat. gr. xx.
Mist. Camph. ʒi.

once, twice, thrice a day, or maybe every six hours. If the hyperæmia result from over-work or over-excitement, and the circulation is rather quick, then opium might be substituted for the bromide. The exact proportions of each factor in the prescription would be determined by the requirements of each individual case. The bowels should be kept freely open in all cases; and smart purgation should be followed up by a slightly active state of the bowels for some time. In all cases where the cerebral hyperæmia commences in alterations in the cerebral cells, the treatment will comprise two factors, but the agents calculated to allay cerebral excitement take the first position; vascular depressants and purgation being ancillary and subordinate, but nevertheless not to be neglected.

§ 208. *Vascular Hyperæmia.*—Congestion of the brain may be active or passive, and is the result of the same general causes which produce congestion in other organs. The symptoms may be slight or they may be severe. In the slighter forms the patient complains of headache, dizziness, tinnitus aurium and optical illusions. Sleeplessness is usually a prominent symptom. In venous hyperæmia the phenomena of mental depression are usually more marked than those of excitement. There is a dull sense of oppression, and the patient suffers from an uncontrollable desire for sleep, which is often especially noticeable even after slight fatigue or exertion. In the more severe forms of hyperæmia there is usually a slow, full, and bounding pulse, forcible impulse of the heart, atheroma of the vessels, a state of general plethora, a florid countenance, and an injected eye. The pupils are contracted, and there may be some intolerance of light. There is no actual delirium; but there may be some excitement in the intellectual functions, præternatural sensitiveness to all impressions, and abnormal acuteness of the special senses, together with intense headache. Old writers often spoke of the feeling being as if a bolt were driven into the forehead. In such cases there is a high blood-pressure, and the great danger is rupture of some encephalic vessel.

Arterial rupture here is imminent, and the first thing to be done is, to bleed. Then an ample purgative of potassio-tartrate of sodium and scammony, jalap or gamboge, should be administered; to be followed by sulphate of magnesium and small doses of antimony, so as to keep up the action of the bowels and to depress the circulation. If there be much excitement, bromide of potassium at bed-time in full doses may be added. A low diet of rice-water and lemonade iced, and general quietude, are indicated. A non-nitrogenized diet is necessary for some time. Alcoholic stimulants must be strictly prohibited. The whole aim of the practitioner will be directed to moderating the vascular excitement and relieving the arterial tension. Such patients are usually the subjects of chronic Bright's disease, the hypertrophied left ventricle and the high arterial tension forming sources of imminent danger to the thin-walled encephalic arteries, no longer structurally sound. In lowering the vascular excitement, venesection may be resorted to, especially if drugs be not at hand; but the tendency to reaction must be kept down by adding to it, as quickly as may be, vascular depressants and the effects of catharsis. Dry cupping is useful, and should be repeated frequently. In rural practice, and amidst the exigencies of travel, and of remote colonies, bleeding may be indicated; and it may be necessary to repeat it if other means of subduing the vascular excitement are unattainable.

A well-marked condition of combined cerebral cell-activity with high vascular tension is seen in the earlier stages of the general paralysis of the insane. Not only is there much cerebral excitement, but there is hypertrophy of the heart, with loud accentuation of the aortic second sound, indicating high arterial tension. In the paroxysms of exacerbation to which such sufferers are liable, there is great excitement with a full pulse. Crichton-Browne ingeniously applied to the relief of this condition the Calabar bean; having noted that Prof. T. R. Fraser, in his experiments on this agent, had found vascular depression and muscular relaxation to follow its administration. This logical application of information derived from physiological research, to the needs of practical medicine, has been successful as regards the immediate end sought. Not only that, but it has been found that the continued use of the physostigma

tends to check the general progress of the disease, and in some cases even to bring about a distinct improvement. This is one of the most striking illustrations of applied physiological knowledge on record; and forms a matter of much interest outside its importance as a therapeutic measure of great value in the practice of psychological physicians.

Such are the means then by which we can control conditions of cerebral hyperæmia.

§ 209. *Cerebral Anæmia.*—This is the opposite of the above-described condition. It may be found in two forms; the one simple arterial anæmia, and the other arterial anæmia with venous congestion. The first is found well marked in cases of general anæmia, such as may result from severe hæmorrhage, and in simple dementia; the other is found most markedly in advanced cardiac disease. There are various circumstances under which cerebral anæmia may manifest itself; and these general conditions are of much moment in selecting the line of treatment to be adopted. The local condition of cerebral anæmia may be found along with general anæmia; and in chlorotic girls and delicate women a condition of cerebral anæmia, with drowsiness, vertical or even frontal headache, and depression of spirits, will often remain for some time after the general signs and symptoms of anæmia have passed away. In chronic universal cerebral anæmia the patient is always fretful and restless, his sleep is disturbed by dreams, and he suffers from great mental depression. Vertigo headache, nausea, and faintness are common concomitants. At other times, anæmia is associated with spanæmic conditions in various forms of blood-poisoning, where the red corpuscles are broken down, as in malarial disease, lithiasis, and amenorrhœa. Here the blood poison must be met by the specific remedies for each form, as well as by the administration of iron. In cases of lithiasis cerebral anæmia is common; especially in the more advanced stages of Bright's disease, where there is arteriole spasm in the branches of the encephalic arteries, together with a failing circulation. In such conditions potash with digitalis is indicated. At other times cerebral anæmia is the outcome of heart-failure, where the blood-pressure is low and the vessels are unfilled. Here digitalis, by acting upon the heart at the

same time that it tightens down the arterioles on the blood column, raises the blood-pressure and fills the cerebral vessels; and so is most useful.

In all cases there are two points to be attended to; they are the increasing of the blood-pressure, and the supply of liberal quantities of arterial blood of normal quality to the contents of the encephalon. Any deficiency in quality as well as quantity is felt by the cerebral cells. Whatever their potential activity, a free supply of healthy blood is requisite to their proper functional working. There are several points to be attended to in the treatment of cerebral anæmia. In all cases the blood must be of normal quality and rich in nutritive material. Chalybeates are almost always indicated; and in cases of spanæmia from the presence of some poison, the chalybeate must be combined with some specific remedy; without which iron is often given in vain. Then, while giving agents which increase the blood-pressure, it is desirable to administer nervine tonics, quinine, strychnine, or belladonna. The first two all are fairly familiar with; but belladonna is not yet so well known, for this purpose at least. Yet belladonna acts powerfully upon the heart at the same time that it dilates the encephalic arterioles. Crichton-Browne found it especially valuable in the treatment of emotional melancholia, where there is defective nervous activity, the result of some shock, which depresses alike the cerebral functions and the circulation. Its use, too, is indicated in that *stadium melancholicum* which so commonly precedes actual insanity. Alcohol has an identical action upon the circulation and the brain-cells; and it is the temporary relief it affords to the miserable depression of cerebral anæmia which forms its irresistible allurement for many persons, especially females. If their cerebral anæmia be relieved by other measures the craving for alcohol is not felt; when the effects of other remedies wear off, then the craving comes back with all its terrible resistless force.

This is one point to be attended to in the administration of tonics, and especially nervine tonics, in case of cerebral anæmia. Nothing is more common than to find anæmic patients complaining of headache from the administration of the necessary tonics, because their nerve-centres have been brought into

such a state of hyperæsthesia by the impaired nutrition that they can hardly tolerate anything of a stimulating nature. A little excess, therefore, even of spanæmic blood, may cause distress to a feeble brain, which, after it has acquired a more healthy tone, will bear and be benefited by a larger amount of much better blood. The case is similar to that of the starved man, whose very preservation depends upon his being fed most sparingly for some time.

In such cases, and they are frequently met with, the administration of tonics and iron may be combined with bromide of potassium with advantage. This combination rarely disagrees, even where nervine tonics alone, or not so combined, are intolerable. Usually, too, it is well to keep up a gentle action on the bowels; as is so well known in connection with the commencement of a course of ferruginous tonics.

There is also another point to be attended to in connection with the treatment of cerebral anæmia, and that is its relation to the production of sleep. If the more strictly depressant hypnotics, as chloral and bromide of potassium, be given, the tendency is to retard recovery in the convalescent melancholic; and in many cases of melancholia to transfer it on to the more pronounced condition of dementia. Sulphonal and trional are preferable; as not tending so strongly towards the production of chronic brain-starvation as these other two agents do. This point is of the more importance in that there is often persistent insomnia in cerebral anæmia. Whatever the medicines given at bed-time, nervine tonics should be given during the day.

§ 210. *Local Cerebral Anæmia.*—This is a subject of importance both in general practice and in asylum practice. We have just briefly reviewed the circumstances of general cerebral anæmia; not, however, alluding to that form which is apparently the result of vaso-motor spasm—not being gouty. In many cases this spasm is the cause of cerebral anæmia, especially in the demented forms of melancholia. It is here where belladonna is often so useful. But there is also partial cerebral anæmia, as in ordinary melancholia when the intelligence is unaffected, and the patient merely seems to see everything through sepia-tinted spectacles. Conditions of depression in the sane are of like causation. Here there is, in all proba-

bility, an anæmic condition of the posterior, or occipital cerebral lobes, which, as we have seen, are fed mainly by the branches of the vertebral vessels after their fusion into the basilar artery. Schrœder van der Kolk and Laycock have long taught that these occipital lobes are in connection with the systemic sensations and the viscera—conclusions corroborated by the investigations of Ferrier. Consequently we can understand the melancholia of liver disease; or even the more illustrative cases of melancholia attendant upon scybalæ in the lower bowels, or upon a misplaced uterus, coming on and passing away with these causal conditions. Not only so, but there is a point of much importance, hitherto curiously overlooked; and that is the vaso-motor nerve-supply of the carotid and of the vertebral arteries. They are quite distinct. The carotid arteries receive their nerves from the superior cervical ganglion; while the vertebral arteries are supplied from the inferior cervical ganglion, which is in more intimate relation with the thoracic ganglia and the splanchnic nerves, which supply the abdominal viscera. Cyon and Aladoff have traced nerve-fibrils from the vaso-motor centre down the vertebral arteries, through the inferior cervical ganglion, the annulus of Vieussens, the thoracic ganglia, and down the splanchnics to the liver. This of course applies to efferent descending fibres passing from the centres to the viscera; but, judging from analogy, the afferent fibres ascending from the viscera to the nerve-centres follow the same route. Thus we now comprehend how disturbance in the abdominal viscera can produce melancholia, without the intellect being obviously affected. There is anæmia of the posterior cerebral lobes from arteriole spasm, the result of distant irritation; and consequently the removal of this distant cause is as necessary to the treatment of the case as is the administration of nervine tonics and chalybeates. In simple melancholia, the motor-centres—in the parietal lobes—are not affected; in general cerebral anæmia, as in dementia, they are involved.

§ 211. *Insomnia.*—Sleeplessness is one of the most troublesome ailments which medical practitioners are called upon to treat. It is annoying to the patient—to how great an extent, probably, only those who suffer from it can appreciate; it is troublesome to the practitioner from its frequently intractable

character. Much, however, of the difficulty of treating insomnia satisfactorily lies in the complex associations of the malady. The measures which will readily procure sleep under one set of circumstances fail signally when employed under other circumstances; and yet the causes of such failure often remain undiscovered because they are not studiously sought for. In order to render the subject more intelligible, it may be well to glance at the physiology of sleep, and then to proceed to review the different forms of insomnia, with the form of treatment appropriate to each.

Sleep is a condition of physiological cerebral anæmia. At one time—not so very long ago—it was thought that sleep was connected with a state of vascular congestion of the brain; this view took its origin in the vascularity found after fatal doses of opium. In reality, in such fatal cases there is marked venous congestion of the brain; but then the condition preceding death here is fatal coma, not normal sleep. The experiments of Donders and others have placed beyond doubt the relation of sleep to cerebral anæmia. Such conclusion might have been anticipated from the physiological law—that the functional activity of an organ is in direct proportion to its blood-supply. This condition of anæmia is produced by the co-operation of two factors: one, a modification of the vascular system; the other, a diminution of activity in the cerebral cells themselves. It is the combination of these two factors in the production of sleep that must ever be borne in mind in the treatment of each case of insomnia. According to the predominance of one or other of these factors must the remedial measures be selected and proportioned, if they are to be successful. The measures which would be most appropriate to the relief of insomnia in the convalescence after a fever, would be most unsuitable in the sleeplessness of the gout.

It will, perhaps, be well to take the simpler forms of insomnia first, and then to proceed to the more complex and intractable forms. With many persons sleep is unattainable if their feet be cold. This condition, depending upon contraction of the arterioles of the lower limbs, is not confined to the extremities of the limbs, though, of course, it is most pronounced there. It affects a large portion of the vessels of the body, and by

thus, as it were, driving the blood to the head, keeps up a condition of arterial vascularity in the brain, which effectually prevents sleep. Here the warming of the feet is often sufficient to permit of sleep without any resort to hypnotics. In order to warm the feet, many resort to hot bottles; but a much more effectual method, especially with young persons, is to immerse their feet in cold water for a few moments, and then to rub them well with a rough towel until they become warm. If this be done ere getting into bed, that coldness of the feet which is so inimical to sleep, will, usually, be no longer felt.

Cold is often a cause of insomnia. If insufficiently clad, so that the cutaneous vessels are not relaxed, sleep is rarely sound, when attained at all. It is only when stupefaction from cold occurs that the dangerous coma-sleep comes on, which is so often fatal. With many persons sleep is impossible if the bed be not warmed previous to their entering it. In these cases, the arteriole contraction, induced by the contact with the cold bed-clothes, does not pass readily into the opposite condition of relaxation, and so sleep does not come on. This state of affairs is very commonly met with among the aged, and most so in those who suffer from some form of heart-disease. In such cases it is not only desirable to warm the bed and the night-clothes, but even to administer some hot fluid, all the better for containing alcohol, when the patient has got into bed, if any sense of chilliness remains. In the young and healthy, the chill on getting into bed, however, is often of great service in inducing a subsequent relaxation of the cutaneous vessels, and thus conducing to more perfect cerebral anæmia and sounder sleep. Few persons will have failed to note the deep and usually refreshing sleep which follows any disturbance during the night, which has exposed them briefly to cold. Getting up to do some little service for a sick friend, or to attend to some natural call, will usually lead to a sense of chilliness, which makes the warm bed-clothes extremely comfortable on again getting into bed, and which is followed by sound sleep. Here a brief contraction of the peripheral vessels is followed by relaxation, leading to more complete cerebral anæmia.

At other times an increase of the body-temperature is the

cause of disturbed sleep, sometimes amounting to sleeplessness. This is most frequently seen in febrile states, where a delirious condition takes the place of natural sleep. After the temperature has been brought down by the application of cold, a fever patient will commonly fall into a refreshing sleep, until a return to a fever-temperature disturbs it. In slighter conditions of restlessness, associated with too great a body-temperature, the dissipation of a certain amount of superfluous heat by getting out of bed and drinking a draught of cold water, wil usually be followed by sound sleep. At other times, throwing off some of the bed-clothes will achieve the same end: though, if the amount removed be too great, wakefulness may follow from a too low temperature being brought about. With some persons, when the rest is disturbed, it is sufficient to protrude an arm or a leg from under the bed-clothes, so as to secure more loss of heat; and sound sleep will follow.

Not infrequently sleeplessness is due to a condition of high cerebral vascularity, accompanied with excitement in the circulation generally. This associated condition may be due to inflammation somewhere, which sets up the usual vascular excitement of inflammatory conditions, together with excitement in the cerebral cells produced by the sensation of pain received by them. Or it may be due to an inflammatory condition in the brain itself; or to a condition of high cerebral vascularity falling short of inflammation, as in the paroxysms of excitement in various forms of insanity, or in acute mania. Here there will be found in varying proportions, (1) local (cerebral) hyperæmia, (2) general vascular excitement, and (3) a rise of temperature. When sleeplessness is found under these circumstances, the treatment must embrace the different factors, and include each in the remedial measures employed. Opium will not alone meet these complex states. In order to procure its hypnotic effects, it is necessary to combine it with a direct vascular depressant. The rule laid down by Graves for the administration of opium in excitement and furious delirium was to combine it with antimony. Each drug seems to assist the action of the other; and the relative doses must be determined by the circumstances of the case. In furious delirium the tartar emetic must be given in full, and the opium in small

quantities; while, if wakefulness is the chief symptom, the delirium being not very boisterous, the dose of tartar emetic must be reduced and the opium increased. When the condition of wakefulness is little if at all associated with general vascular excitement, opium alone is sufficient to produce quiescence in the cerebral cells. When, however, there is much excitement in the circulation along with the insomnia, then a direct vascular depressant is needed to calm the vascular element in the insomnia. At the same time the antimony affected the body-temperature. The measures employed struck at each and all of the factors of the sleepless condition. In the present day we have chloral-hydrate, and other remedies of this class, which combine the actions necessary for the relief of such form of insomnia. They act upon the nervous system; lessen the heart's action; and lower temperature. But if thus suitable to one form of sleeplessness, the very qualities which here render them so valuable constitute objections to their use in other forms of insomnia.

There are some points to be noted in connection with the relations of sleeplessness to pain and to pyrexia, which are deserving of attention. Pain excites the cells of the sensorium, and such activity in them causes them to attract more blood to themselves, by which their activity is maintained. That, however, is not all. Pain has a stimulant effect upon the circulation, and causes a rise of blood-pressure in the vessels of the body generally, including those within the cranium. If pain is not too excessive, it does not induce shock; indeed, the pulse will be found to be fuller, and less compressible, while its beat is slower, during the infliction of pain. The effect of the pain is often to improve the pulse, which becomes slower and fuller under the stimulus. In conditions of severe pain accompanied by vascular excitement, opium should be combined with a direct depressant, as aconite, antimony, or chloral, in order to successfully overcome the resultant insomnia. Opium will diminish the receptivity of the cerebral cells, but, alone, it is not sufficiently depressant to affect the circulation. Heat is a most powerful excitant of the heart's action, and conditions of pyrexia are ever accompanied by an elevation in the number of pulse-beats in the minute. Such stimulation of the heart causes an

abnormal amount of blood to be pumped into the arteries, and this arterial fulness is hostile to sleep. The effects of a too high temperature in disturbing sleep has been alluded to before, and the effects of lowering the body-temperature in inducing sleep referred to. In conditions of pyrexia without pain, opium alone is unsatisfactory as an hypnotic; it is here far inferior to chloral. Indeed, in the treatment of sleeplessness due to too high a body-temperature, apyretics are distinctly called for; it may not be amiss to combine them with the ordinary soporifics, but they constitute the treatment essentially.

All powerful impressions made upon sensory nerves not only excite the sensorium, but they raise the blood-pressure. This holds good of sensations received by nerves of special sense, as well as by those of general sensation. The eyes are closed in sleep, and the cutting off of the stimulant sensations, coming in by the optic nerve, conduces powerfully to that result. Conversely, on awaking the eyes are opened, and the inrush of sensations caused thereby produces a more active state of wakefulness. If, when partially awake, the eyes are kept closed, sleep more readily returns than is the case when the eyes are opened: and similarly if the eyes are opened in the dark, there is less stimulation experienced than occurs if the eyes are opened in daylight.

Sleeplessness is a common symptom of lithiasis or suppressed gout. The patients complain that they cannot get off to sleep; it is not pain that keeps them awake,—they cannot "catch sleep," to use the expression they commonly resort to. Their thoughts travel in a circle, and the process is tiresome and barren of result, and tends to keep up the feeling of irritation experienced. When morning is far advanced sleep comes on, but it is brief, and the sufferer awakes weary and unrefreshed. Here the cause of the sleeplessness is almost entirely the high blood-pressure; though probably the effects of nitrogenized waste upon the cerebral cells are of a stimulant nature. This high blood-pressure is due to the action of the effete matter in excess upon the circulation; of which the accentuated second sound, the incompressible pulse, and the free flow of pale urine are witnesses. In sleeplessness occurring under these circumstances opium is useless, and very commonly is harmful, increasing the

excitement instead of allaying it. Chloral is often useful, and with some gouty persons acts like a charm, though it disagrees with others. Bromide of potassium is serviceable here, and may be advantageously combined with hyoscyamus or with tincture of senecio. This last combination may be taken at bed-time in such insomnia, but a course of alkaline waters, or potash and buchu, with a non-nitrogenized diet, is most desirable. The elimination of the already existing uric acid by such remedial measures, and the arrest of its further production by a suitable dietary, will be found most effective in the alleviation of the sleeplessness of the lithæmic—a sleeplessness which is very intractable to ordinary hypnotic measures. There seems much reason to suppose that the persistent insomnia of the more affluent classes, which impels them to resort to the most powerful and dangerous hypnotics in order to procure sleep, has in it an element of gout which is not recognized, and which thwarts the measures ordinarily effective and operative; so that remedies of unwonted potency or in unusual doses are necessary in order to secure sleep, or rather unconsciousness.

A totally different form of sleeplessness is found with cerebral anæmia. Here there is sleepiness felt during the day, and especially when the upright posture is assumed; but at night, on lying down, instead of the inclination to slumber becoming more pronounced, a state of wakefulness is instituted. Hammond explains this on the ground that the brain is anæmic, and consequently lethargic, when the skull is the highest point in the organism, and the blood falls away into the unfilled vessels by the force of gravity; but that, when the horizontal posture is assumed, the head ceases to be the highest point and then the blood returns to it, fills the intracranial vessels, and a state of wakefulness is induced. These patients could sleep when going about their duties in the day, but they cannot sleep when they go to bed at night. Such a condition is found in a most pronounced form in melancholics. It has been found that in such patients bromide of potassium, or chloral, however effective in procuring sleep, are unsuitable and indeed mischievous from their tendency to aggravate the condition of anæmia. When administered to the convalescent melancholic they retard recovery, and when given in the earlier stages tend to produce

still further "brain starving," and to transfer the condition from one of temporary melancholia into the more advanced and permanent condition of chronic dementia. Both Crichton-Browne and Hammond decry the resort to the above-named narcotics in cerebral anæmia, and advocate instead the guarded use of alcohol and opium. These latter agents first dilate the cerebral vessels ere producing contraction of them, and so relieve the condition of gloom ere the patient falls asleep. Nor is the condition of cerebral anæmia induced by them so persistent and mischievous in its after-consequences as that produced by chloral and bromide of potassium. In the sleeplessness of cerebral anæmia, alcohol and opium may be given alone or combined at bed-time, for the purpose of procuring sleep; but their administration must be accompanied by a generous and liberal dietary, and by the exhibition of iron and of quinine in fair quantities. By such means the brain recovers its normal vascularity, and the sleepiness of the days and the sleeplessness of nights are exchanged for the usual sensations. In order to give tone to the unfilled vessels digitalis—though it raises the blood-pressure—may often be given with advantage along with the quinine and iron. There is nothing inconsistent about the use of quinine under such circumstances.

Sleeplessness is a consequence of cerebral hyperæmia. We have already considered its association with conditions of active hyperæmia, accompanied by general vascular excitement, and the appropriate measures for its treatment. There is, however, another form of cerebral hyperæmia, in which insomnia is a prominent feature, that calls for remark. This is a form of passive hyperæmia from partial vaso-motor paralysis of the intracranial blood-vessels, usually associated with mental overwork. It is described by Niemeyer as a condition in which the mental disturbance is so great that it stimulates melancholia, or mania. There is restlessness, anxiety, a general sense of dread, and such patients "cannot stay long in one place, go about restlessly, are worried, and are conscience-stricken about slight trifles." This last is a very significant statement, and throws a light upon some unfortunate actions otherwise apparently inexplicable. In such cases the sleeplessness is almost absolute; opiates have no effect, or, after the exhibition of this

remedy, which is injurious and dangerous to the patient, there is a short restless sleep, from which the patient awakes with all the symptoms increased. In such conditions it is obvious that the line of treatment to be pursued is one which will rest the excited and irritable brain, and in doing so embrace the condition of the blood-vessels, which is so important a factor in the malady. That a brain overtasked and approaching exhaustion should show great irritability, is in strict accord with what we know of the symptoms of commencing nerve-exhaustion. That the wearied brain should become hypersensitive about trifles is also in unison with our experience, and that the mental symptom—a morbidly exacting conscience—should manifest itself, is what we may readily believe. In such a state the person is indeed to be pitied, for all causes of pain or trouble are magnified, while the power to bear up against them is lessened. Nor is the suicide which occasionally gives a shock to society unintelligible, when we consider the number of individuals, and those too the most sensitive, who are reduced, more or less pronouncedly, to this pitiable condition. In estimating the effects of worry, of anxiety, of over-sensitiveness upon any individual, we must not either overlook or underestimate the peculiarities and capacities of such individual. What may be sufficient to utterly break down one person, may be borne by another with comparative equanimity, or even perhaps with ease. But because such is the case, it does not follow that the burden has not been too great for the person who succumbs under it.

What the line of treatment to be pursued under these distressing circumstances should be now calls for our attention. Niemeyer has told us that opiates are injurious. The vasomotor paralysis which follows the use of this agent evidently aggravates the already existing condition. Chloral produces cerebral anæmia, but from its enervating effects upon the circulation tends to make the general condition worse, while affording temporary relief. It is not merely a question of regulating, so far as may be possible, the intracranial circulation; the condition of the cerebral cells calls for attention. A great portion of the hyperæmia is due to the persistent call of these cells for blood, until passive congestion, from vasomotor paralysis, is induced. It is obvious then that one con-

stituent factor of the treatment must be to lessen this cerebral activity by some suitable agent. Of all our remedies for such end, the bromides are the most efficient. Bromide of potassium leads to cerebral anæmia chiefly by its action upon the cerebral cells, lessening their activity and so diminishing their call for blood; while it exercises some sedative effect upon the circulation. With it digitalis may be advantageously combined. The efficacy of such combination, in cases of cerebral disturbance with a feeble circulation, is no longer a matter of hypothesis, it is an ascertained fact. Doubtless in such cases it is the action of digitalis upon the peripheral vessels rather than its effect upon the heart which is valuable here. The action of digitalis in contracting the terminal vessels is pronounced, and such action is very useful in the cases under discussion. Possibly the allied action of ergotin may make it equally serviceable; and the use of ergotin in asylum practice to control cerebral hyperæmia is on the increase. By such a line of practice we secure a condition of comparative inactivity in the cerebral cells, and also give tone to the enfeebled encephalic vessels. But while doing so, the demands upon the brain should be reduced to a minimum, and all outward and extrinsic sources of disturbance should be, as far as is practicable, done away with. As complete rest as is attainable is an important matter. Then again the blood itself should contain fair quantities of nutritive material, in order that the nutrition and restoration of the exhausted cerebral cells may be achieved and augmented. For this end liberal supplies of easily assimilable food, some generous wine, and iron, along with quinine, or even strychnine, should be taken. There is no inconsistency in giving quinine and strychnine, powerful nervine tonics, during the day, together with hypnotics at night. By the combination of such measures good results may be expected, with more or less confidence, according to the state of the patient, the original constitution, and the conditions of the environment. The treatment, however, requires time, and compliance with it on the part of the patient. If it be impossible, or be thought to be impossible, to lessen the demands upon the brain, and this latter will but too easily and readily occur in the abnormal conscientious state which now obtains, the treat-

ment will be unsatisfactory; and then the patient will usually resort to those potent measures by which sleep, or rather unconsciousness, may be certainly induced, and will sooner or later pay the price for it.

When, however, in addition to the condition just described, there is added an element of lithæmia, and the cerebral cells are further irritated by the products of nitrogenized waste, then the case becomes trebly difficult to manage. The tendency to such complication is furthered by the resort to stimulant nitrogenized food by such persons, in order to increase their strength and improve their condition; a very natural error. In many cases, too, in addition to this excessive consumption of albuminoid matters, there is imperfect elimination of waste matters from the small quantities of fluid imbibed, which are insufficient to that thorough washing-out of the tissues, so desirable when there exists an excess of effete matter. This latter is especially the case with ladies, whose social requirements cause them to imbibe as small a bulk of fluids as is practicable. In such cases it is necessary, in addition to what has just been stated, to give the patients free supplies of alkaline waters, as Vals, Vichy, Carlsbad, seltzer, or others, so as to at once secure the quantity of fluid necessary, together with the formation of soluble urates, which will readily find their way out of the organism by the natural emunctories. Without attention to this factor in the case, the other remedial measures will be but inefficient, or even futile.

Having thus reviewed the different forms of sleeplessness, except perhaps that of acute mania, which scarcely comes within the sphere of this article, something may now be said about the chief forms of hypnotics in common use. They cannot be discussed at length, such treatment of the subject would be out of place here: the chief indications only can be given.

To take Opium first. Its use is indicated in conditions of insomnia which take their origin in pain. When there is vascular excitement present, it is desirable to combine with it direct depressants of the circulation, as aconite or antimony. The subsequent cerebral anæmia induced by the resort to opium is not so pronounced as is that induced by chloral.

Hyoscyamus takes its place alongside of opium, and may be resorted to in cases where opium or morphine disagrees, as in cases of chronic renal disease. For these last class of patients the tincture of hop is often very serviceable, though now rarely prescribed; it is a very satisfactory agent in such cases.

Chloral is comparatively valueless in sleeplessness due to pain, and is inferior, in this respect, to butyl-chloral-hydrate, trional, sulphonal, and many other drugs. It is, however, useful in conditions of vascular excitement, either alone, or in combination with opium. In the delirium of acute pyrexia in children it may be usefully combined with the bromide of potassium. In cases of sleeplessness where there is a sustained high blood-pressure, or where there is distinct pyrexia, chloral-hydrate is the hypnotic *par excellence*. It is, however, decidedly to be avoided in cases where the inability to sleep is due to worry and to brain exhaustion. In such cases, as in melancholia, the cerebral anæmia which follows its use is most objectionable and mischievous. It amounts to "brain-starvation," in fact, and the persons so affected are reduced to a pitiable condition. The persistent resort to chloral-hydrate is most disastrous in its consequences, and the temporary relief afforded by it is not to be set against its after effects.

Bromide of potassium has a decidedly sedative effect upon the brain-cells; and the cerebral anæmia produced by its administration is rather due to its sedative action upon the cerebral cells by which they attract less blood to themselves, than to its effects upon the circulation; though doubtless to some extent it does diminish the activity of the heart. Its special advantage lies in its utility, where cerebral activity is kept up by far-away peripheral irritation, especially when that irritation lies in the pelvic viscera. It may be given alone, or with opium, or with chloral, according to circumstances; and may often be usefully combined with hyoscyamus in cases where opium is contra-indicated. Its constant use, however, leads to diminished brain activity, and to intellectual lethargy.

Chloroform is a most potent agent, but is rarely resorted to as an hypnotic until other means of attaining the desired end have failed. The dangers attendant upon its use are so great that it is only resorted to in dire necessity. It is, however,

occasionally used as a narcotic by the profession, but more frequently by persons upon their own responsibility. This chiefly occurs in those subject to sudden and unendurable pain, where nothing but the narcosis of chloroform would be effective. Probably indeed in these cases, all other and less objectionable means of attaining relief have been tried and have failed. According to Claude Bernard, by combining opium, or rather morphine, with chloroform, the sensory nerves and centres are affected ere the intelligence and the motor powers are much influenced. But with chloroform alone all are equally and alike affected. The danger of chloroform inhalation lies chiefly in the risk of an overdose being taken; as unconsciousness creeps on the motor power is involved, and then the amount taken may be, and too often is, far beyond what was intended. If resort to chloroform inhalation cannot be avoided by certain sufferers, surely it is not objectionable from any point of view that the danger attendant thereupon be reduced to a minimum.

There is another hypnotic agent of undoubted potency, which cannot be overlooked in the present inquiry, and that is—alcohol. If there be any use of alcohol that is free from objection, it is its use as a narcotic in certain conditions. With many persons a dose of alcohol at bed-time is the very best nightcap they could possibly resort to. The cases best adapted to its use are those where there is mental worry and anxiety. In such states the first effect of alcohol in removing gloom and substituting pleasing sensations for unpleasant thoughts is eminently useful. A series of pleasant mental images are brought up on the mental horizon by its means, in place of the *triste* and sombre subjects which before its use occupied the foreground of the consciousness; and with such agreeable objects uppermost, the secondary effects come on, and the patient is wrapt in a refreshing renovating sleep. Probably the evil after effects of alcohol, so used, are less than those of any other agent which would achieve the same end. Unfortunately, however, commonly the very persons for whom alcohol would form the best hypnotic are those most opposed to its use; and where a full dose of alcohol would constitute the best remedy that could be resorted to, prejudice prevents its employment.

So much for the ordinary narcotic agents in common use.

Over and above these are some other means of ensuring sleep, which are not contained in the pharmacopœia. Nor are these measures of little avail; they might be more commonly resorted to with advantage.

The first of these is bodily exercise, especially out of doors. Many cases of sleeplessness, as our common experience tells us, are due to this cause. With a number of individuals the omission of their wonted walk is followed by a restless and uneasy night. In such cases it would seem very probably there are a number of motor centres in the cerebral convolutions which are still in a state of high tension, highly charged and unrelieved by discharges. It is not difficult to conceive that under such circumstances there should be such activity remaining undischarged as shall seriously interfere with the quiescence of those centres which have not only been relieved by discharges, but which are in that state of irritability which is the forerunner of exhaustion. Muscular exertion would relieve this condition of matters, and so would tend to the induction of sleep; not only that, but, according to Preyer, the products of muscular exertion are directly hypnotic in their action. If such a view should be substantiated, then muscular activity will take a decided position in the ranks of the means by which sleep may be secured.

In addition to these measures already enumerated, there are the mental means of attaining repose. Just as worry, excitement, whether of a pleasant or of a disagreeable nature, anxiety, and other mental conditions do away with and destroy sleep, so psychical quiescence tends to establish it. Different individuals seek this quietude in various ways and by varied measures. Thus in many families it is customary to abstract the mind from the distracting affairs of life by music; and such diversion of the thought is commonly productive of a mental condition highly favourable to sleep. With others again, whose minds are cast in a sterner mould, family and private devotion advantageously occupy the close of each day. Such diversion of the mind at the close of each day cannot be too highly commended from a physiological point of view. Whether persons or families make their selection on higher or lower grounds, this is not the place to discuss their choice.

Many contrivances to secure sleep have been devised which act through the mind. Of these the counting of sheep rushing through a gateway, or of their leaping from a height in single consecutive order; or the mental repetition of numerals; or of *x*, *y*, *z*, are the most common; when there is simple want of consentaneity in the different cerebral centres, or a certain amount of mental activity remaining unused up, such plan may be successful in inducing sleep. But sleeplessness is very often a much too serious matter for any such means to be efficacious, and its successful treatment usually entails some physiological knowledge of the nature of sleep, as well as a wide and comprehensive grasp of the different factors in each case, and of the means of meeting and of combating them.

§ 212. *Delirium.*—This is a condition of cerebral disturbance often of grave omen; always more or less alarming. It is much commoner in children than in adults; and is very much easier induced in children, and by lesser exciting causes, than it is in adults. It is more readily brought about in persons of a nervous diathesis than in those of other diatheses. It is very common in fevers, and still more in exanthemata, especially in scarlatina. It arises under these circumstances from the combined effect of the fever-poison, the excited circulation, and the increased temperature. When, however, it occurs in the later stages of continued fevers, where the typhoid condition is pronounced, then it is due in a great measure to the amount of tissue-waste in the blood. In the early stages of fever, delirium is scarcely serious in the young; though its import is grave if the person be an adult, and still more an old person, whose brain is usually not easily perturbed. When it occurs in the typhoid condition it is serious, and frequently passes into coma and death. In the management of delirium there are several points to be carefully attended to. One, and a very important one, is the partial prevention of the oncome of delirium by avoiding what is calculated to excite it. This is a matter not sufficiently attended to by some practitioners. When a person is severely ill, and the brain has a tendency to wander, then little changes in the environment become very important. If the aspect of the wonted room is much altered, the wandering eye and unstable brain, especially when awaking from slumber, fail to recognize

the altered surroundings. The first impulse is to escape from the strange place, and to get home—an instinctive feeling when very ill. As a result an outbreak of delirious violence occurs, which leaves the patient exhausted and powerless. It is not this alone which is to be avoided—though it is not without its own importance—it is the uncomfortable feeling which remains in the patient's mind, that those around him are opposed to him and hostile to his interests. What the patient wishes to do is to him quite intelligible and perfectly proper to be done; and when he finds that instead of being aided by those around him —the friends and relatives in whom he has always fondly trusted—they thwart and oppose him, a sickening feeling of suspicion and misanthropy pervades the mind, which is most undesirable. If it is impossible to accede to the patient's requests, the attendants must meet them by cajolement, rather than by active resistance and the force of brute strength. It is a matter of moment when adults are ill, and likely to be delirious, not to change the aspect of the room much, even if the ailment be an infectious one; the exciting of delirium, and its ill-effects upon the patient, must be set against the possibility of infection being conveyed by the ordinary furniture of the room being permitted to remain in it. With children it is of less moment, and every removable and unneeded article may be advantageously taken away. So much for the psychical side of the management of delirium.

The actual therapeutic management rests much upon the circumstances of the case, and the conditions with which the delirium is associated. If there is cerebral hyperæmia, depressants and sedatives are clearly indicated. If there is also a febrile condition, antipyretics and other means of lowering temperature must be adopted. If the skin is dry and imperspirable, agents which excite free action in the skin may be resorted to; or the temperature may be lowered and heat abstracted by the external and internal use of cold. With the head on a pillow of cold water, and a bladderful of iced water on the head, sleep often can be induced in the excited and delirious patient. An ice-cap is a very useful means of cooling the head. It is composed of coils of india-rubber tubing, through which a stream of iced-water is allowed to flow. When the patient is packed

in wet sheets, or placed in a bath and cooled down, the delirium passes away, and reason resumes her seat, showing that delirium is largely a question of temperature in the blood and brain; the return of the delirium along with a rise of temperature completes the argument. Another point is the state of the pulse. If feeble, fast, and intermitting, digitalis and bromide of potassium in combination are indicated. If full and bounding, or incompressible, chloral, or the bromide, together with depressants, are the agents to be resorted to. In delirium tremens, large doses, half-an-ounce, of the tincture of digitalis have been given. This plan is only safe when the heart is very feeble or failing, and the cardiac ganglia are nearly exhausted; then it is good. When the delirium occurs in a typhoid condition, no matter whether connected with a specific fever or not, it is desirable to procure more perfect depuration of the blood by the use of bitartrate of potassium, until the bowels are opened; or by acting sharply on the bowels or the skin, according to the circumstances of the case. Subcutaneous injections of chloral-hydrate may be useful when the brown, furred tongue indicates that a layer of dead epithelial cells lines the intestinal canal, and hinders absorption through them; so that it is useless to give remedies by the mouth. These injections should not ordinarily be stronger than ten grains to the ounce, on account of the local disturbance which stronger solutions so often give rise to.

At other times a form of delirium is met with after the acute pyretic stage is over. It seems rather a form of cerebral exhaustion than a form of active delirium. Stokes enumerates three such conditions: (1) where there is persistent wakefulness; (2) where an inflammatory condition of the brain has existed and been subdued, but delirium or other nervous symptoms still remain; (3) where an excited state of the sensorium exists without heat of scalp or remarkable throbbing of the arteries of the head. To these Copland adds the condition of there being free discharges or unrestrained evacuations. In all these conditions opium is indicated. According to circumstances it might be combined with chloral. In coma vigil such combination is indicated. In children the chloral might be given with bromide of potassium.

§ 213. *Headache.*—In approaching such a complex subject as headache, some kind of division is imperatively necessary, and, perhaps, no more convenient one for practical purposes could be adopted than one of regional division.

Frontal headache is, perhaps, the most frequent of all forms of the malady. It is very frequent in early life, and is very commonly put down to the liver. Certainly it is very frequently met with in bilious subjects, though not by any means confined to persons of the bilious diathesis. It occurs in every grade of severity. It may amount to no more than a dull aching across the forehead up to an agonizing prostrating pain, compelling the sufferer to remain in bed in a darkened room. Such was the headache of Miss Anne Irwine in *Adam Bede.* When her brother took off his shoes, because the least noise was torture to her, he found her in the darkened room with her sister, as noiseless as a cat, sponging the aching head with a little vinegar. "It was a small face, that of the poor sufferer; perhaps it had once been pretty, but now it was worn and sallow. Miss Kate came towards her brother and whispered, 'Don't speak to her; she can't bear to be spoken to to-day.' Annie's eyes were closed, and her brow contracted as if from intense pain." Who does not recognize the fidelity of the picture?

Such headaches seem to find their worst development in these poor spinsters; and how they come about is an unwritten page in medicine. Certain it is they attach themselves to single women in poor health, and are so far neuralgic that they are worse when the individual is below par, and less severe when the organism is fairly well. In less severe form this headache is the "headache" which a lady has when she prefers her own room to joining the family group or meeting "the stranger within the gate." As it is a case of pure subjective sensation which cannot be tested, it has come to be regarded with much suspicion as being readily and easily simulated. Certainly such a headache has been socially convenient, and, perhaps, sometimes has been pleaded without warrant. However, we are not dealing here with fictitious headaches, but with the "Simon pure."

In its slighter forms such frontal headache is common with growing children, and is commonly attributed to disturbances

in the digestive organs; and this view is strengthened by the fact that the pain is apt to follow some indulgence in the way of food, and usually passes off with sickness, or is relieved by a chologogue purge. In its severe forms it gives that bowed-down look of continued suffering exhibited by sundry bilious personages, and which is markedly relieved by cutting lean meat out of the dietary.

In many instances it has been kept up and maintained by dietetic error, the patient believing that he, or rather she, can only take a little lean meat, dry bread, and tea without milk. When put upon a non-nitrogenized dietary, the improvement they make is surprising to themselves. This form of headache is common with that peculiar form of social parasite who cannot work, who is confined to bed, and can only take a little brandy-and-water, which she wheedles from the benevolent and charitable ladies who listen to her story. In reality such a person is a useless social unit, and one form of the chronic drunkard.

Then there is a form of headache which may be frontal or temporal, which is due to the eyes not being quite a pair, and the one being strained to meet the other. Headache in young persons brought on by looking at a book are now commonly found to be cured by a proper pair of spectacles which balances the eyesight of the two visual organs.

Then there is a form of headache mostly found with women of the distinctly neurosal diathesis, which is hemicranial, but chiefly in the front. It may be supraorbital or infraorbital, or it may be felt over a patch as large as a man's palm over and outside the eye, usually the right. There is commonly pain with some tension in the eyeball, and less frequently flashes of light in the eye.

It possesses the characteristics of a true neuralgia, as laid down by Anstie, viz. (1) it is one-sided, or unilateral; (2) it is gusty or fitful; (3) it is aggravated when the general health is lowered; and (4) it is relieved by tonics. Neuralgia is the prayer of a nerve for healthy blood, normal in quantity as well as quality. As to quality, neuralgia is linked with impure blood, and blood poisons, as malaria, syphilis, gout, &c. As to quantity, it belongs to anæmia, *i. e.* blood-poverty. A cold

current of air will start it, or a cold night without a night-cap; very often the long fast betwixt a light supper at night and breakfast at eight without a break causes it. A little food, as milk with malt extract, or some form of malt, in the small hours of the morning will ward off such "fasting headache." The nerve aches because it is starved, and a current of cold air contracting the arterioles of the nerve sheath hungers the nerve fibrils.

Such one-sided temporal headache is not unfrequently accompanied by flashes of light in the eye, with tension in the eyeball, and terminates in vomiting; and, when so associated, is known as *migraine*, or megrims. For its relief some sufferers prefer tonics, others sedatives; some like cold applications, others warm stimulating liniments. As a class these sufferers are difficult to prescribe for—that is, successfully! Tonics suggest themselves, but, unfortunately, these women cannot tolerate the vegetable tonics on account of the susceptibility and touchiness of their bladder-centres, which are excited by tonics. Sedatives give temporary relief, but tend to perpetuate the general condition on which the headache is based. Food gives relief, and does permanent good, but it is very hard to get them to take it when in pain. Firmness is necessary, and is made to look very like harshness by the recusant patient.

A very different headache in character is "vertical" headache. It manifests itself as a dull aching at the top of the head or crown, and is accompanied by mental pain, a sense of misery and wretchedness. This is the headache of cerebral anæmia *par excellence*. It is formed under a variety of circumstances. .It is often the accompaniment of chronic renal disease, and is associated with the facial pallor of the large white kidney. Less commonly it is found with the gouty kidney, and then only with spare beings as a rule. It is found in anæmic conditions, where the brain, perched at the top of the organism, lacks blood when the person is moving about, and is filled when the head is laid down in the recumbent posture. Such patients complain that they are sleepy when upright, but are wakeful when the head is laid upon the pillow. The blood falls away into the ill-filled vessels when upright, but when the head is placed level with the rest of the body, the

blood flows into the intra-cranial vessels and the brain becomes wakeful. Poor, ill-fed persons—whether from actual poverty and inability to get food, but more frequently from defective assimilation—are very liable to this form of headache. It is also found in persons liable to biliary derangements. It may, in such persons, be either toxæmic or spanæmic. That is, it may be due to toxic matters circulating in the blood, which are either formed by the liver, or are formed in the intestinal canal and escape from the portal circulation through the liver into the general circulation, because the liver is incompetent as a "porter at the gate." Whichever of these is the correct interpretation, certain it is that in deranged conditions of the liver toxic matters are formed and find their way into the general blood current, and that these "liver stuffs" act injuriously upon the cerebral lobes, or, at other times, the hemispheres are insufficiently supplied with pabulum, the blood being impoverished owing to the liver not carrying on the further elaboration of the albuminoid material borne to it by the current of the portal vein. In this latter case the brain is starved, and mental pain is experienced as well as bodily suffering. In either condition, vertical headache tells that the brain is injuriously affected. Such combination of physical and psychical pain with mental hebetude is not uncommon with persons who are habitually constipated, and carry a heavy load in their large intestine.

Vertical headache may, then, be due to a variety of causes. The blood may be poor in quality, or it may be insufficient in quantity, or it may contain abnormal and toxic constituents. Sometimes it is due to spasm of the cerebral arterioles in persons who are the subjects of lithiasis—just as the hands and feet are liable to "die" in these persons, and is linked with sharp mental pain, consisting of panophobia and a sense of impending dissolution. When so associated it may come on very suddenly and be very severe. Stalwart men are quickly prostrated under these circumstances.

According to the causal associations must the treatment be in each case.

The opposite condition of vascular fulness gives rise to headache often of a throbbing character, at other times the

pain is like a bolt driven into the head. Such headache is found in well-fed, robust, gouty men, where there is an enlarged left ventricle, a high tension pulse—the condition, indeed, of "the gouty heart." It is usually accompanied by excitement and irascibility, with ringing in the ears, and is relieved by the individual getting into a towering passion, as if the explosion got rid of the state of tension. Warren, in his well-known work, *Passages from the Life of a Physician*, gives an excellent and vivid sketch of such condition in a full-blooded country squire, who was "preparing for the House," and getting ready a thundering speech for Parliament. Venesection relieved him; but in most instances a sharp purgative is more likely to be the remedial measure adopted.

Then, again, headache may be of periosteal seat. Very often there is also present tenderness to the touch. Such headache is distinctly nocturnal, and does away with sleep. Usually this form of headache is found in men who have contracted syphilis in their early days. The iodide of mercury with mercurial inunctions gives effectual relief.

Occipital headache is associated with fulness of the great venous sinuses; and is relieved by measures which do away with this. Sometimes it is a neuralgia of the occipital nerve; and ladies, subject to headaches of neuralgic character, always know that they are in for a bad attack when the pain is experienced in the occiput.

Headache, or cephalalgia, is also found with organic disease within the cranium. It is not experienced until the meninges are implicated; but when it does set in it is very intense, and is described as maddening; so much so as to drive the sufferer to self-destruction. Pain of a throbbing character is found with intracranial aneurysms.

Sometimes persistent pain is felt at the seat of an old injury to the head. A case of this kind is recorded by Komberg, which was seen by him and Dieffenbach, and where the latter put in a large pea-issue as a curative measure. Not only did relief from suffering follow, but the mental faculties which had become grievously impaired, improved very rapidly.

Tic-doloreux is rather a faceache than a true headache.

Then there is the persistent nocturnal headache of syphilis,

which may be osteal and destructive. Here the treatment of the headache is that of syphilis. It may be gouty, and then requires the treatment of lithiasis; or there may be headache from organic disease within the head. This form of headache is the all-absorbing, terrible headache where the patient seems mad with pain. The organic causes of great headache are never diseases of the proper nervous system, but always diseases of its enveloping textures. This view grows upon one with consideration of the subject. The brain itself is insensitive, and extensive disease in it, as softening, sclerosis, a tumour, or an apoplectic clot, exists often without pain at all, except the psychical pain of mental misery. Affections of the meninges, however, produce pain very decidedly. Tubercle of the cerebral meninges, syphilitic diseases of them, or cancer, produce dreadful headache. Aneurysm at the base of the brain produces acute pain. Abscesses produce pain when they reach the meninges, but not before. In all organic headache it is well to look out for other evidences of nervous disturbance; ptosis, a squint, a frown, a palsy, however slight, a twitch, are all instructive. The "choked optic disc" is even more indicative. In organic headache it is most important to make an accurate diagnosis; as on that diagnosis rests the treatment. If a syphilitic growth, in young persons especially, mercury and iodide of potassium must be pushed vigorously and without stint. Often the growth produces other grave symptoms, as paralysis of various parts. They all yield to the specific measures. If there be an abscess, the trephine and the bistoury are indicated; if there be a blood-clot or a tumour, little remains but to lower the vascular excitement, and to take off the results of pressure upon the brain tissue. Cooling purgatives, a non-nitrogenized diet, and the bromides in liberal quantities are the measures most likely to attain this end.

Beyond these well-recognized forms of headache there are others of a more anomalous character, which are often puzzling. Anomalous headaches are often interesting and excite much thought; too frequently, however, barren of result. Medical men have striven to classify them, and to understand their nature and the best means of combating them, with but indifferent success; it remains to be seen how far medical

women will be able to throw light upon a subject specially belonging to their own sex. A lady's headache is often a very obscure affair, when no doubt can exist as to its presence. In one case known to us sewer-gas will readily excite it, and in this case, whenever anything is amiss either in body or mind, this headache is always ready to ally itself to the other trouble. Such a headache clearly belongs to the class "nervous" or "sympathetic" headaches, of which it may be said generically that they are experienced on awakening in the morning and wear off as the day goes on, so that such a sufferer may be prostrate in bed at 9 a.m. and be joyous and merry at the theatre at 9 p.m. Highly musical women are very liable to such headache next day after a concert, and the better the music and the more of it, and the more they have enjoyed it, the worse the headache and the greater the subsequent prostration. In this respect this headache bears a resemblance to that experienced after a debauch, and carries with it a similar lesson.

Mr. Walter Jessop, in an able article on ocular headaches, has shown that headache may arise from hyperopia, myopia, astigmatism, spasm of accommodation, and other similar causes. He says:—"The mere trial of a patient with glasses is not sufficient; it is necessary besides accurate knowledge of the refraction that the state of the intra-ocular and extra-ocular muscular systems should be thoroughly investigated. Until this has been done there is no certainty that the headaches, for which the patient comes, may not still be due to ocular causes."

Dr. H. W. Loeb, of St. Louis, attributes many cases of headache to chronic rhinitis, polypi, septal deformities, and other diseases of the nose. "The nose, so prominent as an ornamental feature of the face, is too often overlooked in searching for causes of distressing conditions; it is too frequently considered a side-issue in the practice of medicine; it is too seldom thought of sufficient importance to warrant examination. The result of all this is that, like malaria and rheumatism, catarrh becomes the bugbear of patients and the cloak for their physician's lack of knowledge. And as headaches are so commonly of nasal origin, and are themselves so common among the ills of men, he who neglects to look for their source, when that source is so accessible, can never hope to rise from the uncertain sea of empiricism."

§ 214. *Cerebral Paralysis.*—Under this heading may be considered paralysis of cerebral origin, whether truly apoplectic, or from embolism, or thrombosis. It is impossible to enter upon these questions here further than as regards their treatment. In apoplexy the brain, or rather a portion of it, is ploughed up and destroyed, more or less completely, by a blood-clot. In addition to the injury so actually done, there is a certain amount of anæmia of the brain substance in the neighbourhood, from pressure. In such case the anæmia becomes less pronounced as the blood-clot diminishes, as it grows smaller and paler, until at last a few scales of hæmatoidin alone mark the seat of the primitive injury. Here a great point is to prevent another attack by a suitable regimen. In embolism and thrombosis, a vessel is occluded, and the part supplied by it becomes functionally inactive from loss of its arterial blood. In these cases the establishment of a collateral circulation until a vascular condition sufficient to admit of functional activity is attained, is the only thing we can look for. It is obvious that little can be done to modify these lesions themselves. Bastian thinks the nitrite of amyl may be of service in helping the formation of a sufficient collateral circulation in embolism. Nitro-glycerine will probably be still more useful. In the various forms of cerebral paralysis attention to the general condition will do much to assist the natural process of repair. In apoplexy, if seen at once, and the pulse be full and hard, venesection, followed by smart purgation and the administration of vascular depressants, might do something to limit the size of the blood-clot. In embolism little can be done to mitigate the original injury. Where there is rupture of a vessel, the blood-pressure must be kept low by alkalies and purgatives, and the adoption of a non-nitrogenized diet. In embolism a rich and liberal dietary may be indicated, and tonics and steel be useful. As regards the general management, it must be conducted according to the especial indications of each individual case. In all cases, however, it is most desirable to keep up the nutrition of the palsied muscles by kneading, shampooing, and the use of electricity. Electricity cannot affect the causal injury; but it can keep up the muscles, so that they shall respond to the slightest nerve-order; and maintain them in good condition to resume work when the

nerve-communications are once more established. The more readily the muscles respond to electricity, the graver the prognosis in each case, as showing the mischief to be purely cerebral. As well as these measures, the muscles may be firmly grasped and the blood squeezed out of them by an attendant every day, so as to keep up a better circulation in them. Many cases of imperfect recovery from paralysis are due to the muscles being allowed to atrophy, so that when the nerve-messengers once more reach them they can no longer respond. Such atrophy must be avoided by the measures mentioned above. Chalybeates, nervine tonics, &c., may be useful, and a liberal supply of rich food may be necessary, to enable the injured parts to thoroughly recover. A certain action of the bowels is ever desirable. Ludwig and Dogiel have found irritation of the intestine, as in response to the touch of the finger, to increase the rapidity of the blood-flow to the encephalon. In all cases of paralysis the greatest care must be taken against cold and intercurrent pneumonia, to which such sufferers are so liable, and which is often so fatal to them.

§ 215. Sunstroke, or Heat-Apoplexy, is a malady of which little, or comparatively little, is seen in temperate climes; but in tropical regions, especially when exertion is called for, it is common. Mental depression predisposes to it. Conquering troops suffer less than those who are not successful. There are two forms of sunstroke met with in India. The most fatal—which generally occurs in the field in those exposed for a long time to intense heat under the sun's rays, after long marches, often with much mental excitement, and with insufficient food, or, worse still, alcohol instead of food—is marked by sudden pallor of the skin, and the patient dies at once from heart failure. In less severe forms there is redness of the face and surface, burning heat of skin, and a full pulse, often dilated pupils and complete coma—frequently with copious micturition preceding it. Such heat-apoplexy is more commonly found in buildings during hot afternoons when men move about absolutely gasping for breath. Here there is incomplete vaso-motor paralysis, with dilated vessels and really a feeble heart, so that bleeding and tartar emetic are distinctly contra-indicated.

§ 216. Affections of the spinal cord are very difficult matters

to approach from a therapeutic point of view. Inflammatory conditions must of course be treated in a manner similar to like affections of the intra-cranial contents. Conditions of congestion of the cord are to be treated by purgatives and by ergot, which exercises a decided effect upon the vascular system of the spinal cord, producing contraction of the vessels. The combination of cathartics—which themselves tend very directly to unload the spinal vessels—with ergotin, contains the best potentialities of success. In cases of anæmia of the spinal cord, with resultant paralysis, more or less absolutely free from spasms, either tonic or clonic, strychnia is indicated. It has been found to increase the vascularity of the cord, dilating the spinal blood-vessels, and indeed exercising an influence the opposite of ergot; and is consequently to be given with iron, good food, and general tonics. Other conditions of the cord, as locomotor ataxy, are very little influenced by treatment. Iodide of potassium has been thought to exercise some influence, but everything is useless, or nearly so, in a curative sense; while palliative treatment is very unsuccessful, and even opium fails to relieve the terrible pains of this malady. Sclerosis of the cord, like similar conditions of the brain, is a malady over which drugs exercise but little control; and the sole hope lies in improvement of the general conditions, and, from that, some local improvement. The application of various agents to the spine, as liniments, plasters, heat, or cold, exercises but little influence; but electricity is often of service in spinal paralysis accompained by anæmia. In some conditions of spinal irritation commonly seen in unmarried ladies, and less frequently in spinsters of humbler grades, counter-irritation along the spine, or large opium plasters from the sacrum to the nape of the neck, are often very useful. But their use is subordinate and but ancillary to measures calculated to reduce ovarian congestion and allay sexual excitement. Hysterical paraplegia is best met by alkaline purgatives and the bromides. Here it would appear that the impressions coming into the lumbar portion of the cord arrest or inhibit the ordinary motor impulses; and the diminution of these sensory centripetal impressions, by the measures just mentioned, is followed by improvement in the paralysis. If the patient be plethoric it might also be desirable to adopt a low diet and to

encourage the menstrual flux. Such at least are the measures which have been proved satisfactory. Aloes, which induces congestion of the pelvic vessels in small doses, acts beneficially in congestion of the pelvic viscera when given freely. Given with sulphate of magnesium and bromide of potassium, aloes is a capital remedy in ovarian congestion; that is if the mixture be pushed to the extent of well-maintained but not too profuse catharsis, so as to secure three or four full motions *per diem*. Affections of the spinal cord do not admit of such classification —therapeutically at least—as is possible in affections of some other organs: and each case demands long and careful thought, and the special application of the rules laid down here, in this and previous chapters.

§ 217. Chorea is as much a spinal affection as epilepsy is a cerebral one. It occurs under various circumstances; and, like epilepsy, may be unassociated with any organic change, or may occur under the most unalterable circumstances. Ocular defects are a common cause of chorea, hypermetropea and astigmatism being frequently met with. As commonly seen in children, chorea is often the evidence of arrested nerve-evolution. It is apt to be common in families of low nervous development, or in those where there is nervous instability. It is found in families where there is also epilepsy, neuralgia, and paralysis. Commonly there is defective motor power, impaired sensation in the affected limbs, and limited intelligence in choreic children. In such cases nervine and general tonics, arsenic, iron, and zinc, are indicated. Then it may arise from embolism; and here the establishment of collateral circulation alone gives relief. All measures, then, calculated to develop such collateral circulation should be resorted to. It may arise from irritation in the viscera, and has been found, like epilepsy, to come and go with a tapeworm. Here the removal of the irritation is the treatment of the chorea. Where the removal of the irritation is impracticable, as in the chorea of pregnancy, nerve sedatives, as the bromides, are most useful. There is all the difference in the world in the treatment of chorea according to its causal associations. But chorea generally is an indication of impairment of nerve-power, of the instability and irritability which shows itself in the nervous system when exhausted, or

insufficiently nourished. Chorea is a disease the essence of which is impairment of nervous power, and that this impairment may manifest itself in many different ways, according to the nerve-centres especially affected. One reason at least why the malady is so frequent in young children is the greater mobility or excitability of the motor department of the nervous system in them than in older persons. What would be a neuralgia in the latter, or some other form of sensory disturbance, or perhaps emotional, takes that of muscular jactitation in them. The plan of giving tonics with liberal supplies of fat is a sound one in many cases. Zinc or iron are also useful; and sulphate of copper does well in obstinate cases. Strychnine is most useful where the cord seems lagging behind in the general evolution of puberty—a common condition for the exhibition of chorea. Sulphate of zinc given in rapidly increasing doses, until the child is taking from fifteen to twenty grains three times a day, is an excellent remedy. At other times belladonna is good, lessening apparently spinal excitability. The combination of bromide of potassium with iron will often give very good effects in cases which have resisted both singly. Where there is simple irritability the bromide of potassium alone may be required. In almost all cases of chorea, as in other functional disturbances of the nervous system, liberal supplies of hydrocarbons, especially fat (in the form of cod-liver oil if necessary), and limited supplies of nitrogenized food, are indicated.

Dr. Curran Pope, of the Louisville Medical College, points out that in the convalescent stage much good can be obtained from the galvanic and static electric currents. He says:—"I use the spinal galvanization, placing the positive pole on the nape of the neck and the negative on the lower lumbar region, using large pads and giving 2-5 milliamperes for from three to seven minutes, making the application daily. I prefer the static insulation from ten to fifteen minutes daily. The alternation of the currents may be of great value. These treatments are *real* adjuncts to general treatment. Chronic chorea is a hard disease to treat. I have given up ever hoping to benefit these cases by medicinal means. I prefer to put them on the partial rest cure and utilize the various mechanical remedies such as electricity, massage, mechanical vibration and hydrotherapy,

coupled with hypernutrition. The judicious use of laxatives are of unquestioned benefit. These cases when recovered are much benefited by the repose incident to a rest in rural neighbourhoods."

§ 218. *Epilepsy.*—Epilepsy consists of motor disturbances of the most varied character, from general and bilateral convulsions to a slight twitch, or the momentary arrest of consciousness, the *petit mal.* Truly epileptic mental discharges are also found. For long the pathology of epilepsy has eluded the search of those engaged in its pursuit; but at length a circle is being drawn around it which is gradually closing up. The thorough investigation of the vascular relations of epilepsy has done away with the theories which made epilepsy rest upon circulatory disturbance; it is found that there is a sudden rise of blood-pressure at the commencement of the fit, which passes off quickly. Probably there is some hypervascularity in the nervous matter involved in producing the fit; but the fit itself is an explosion of nerve energy in overcharged or unstable nerve-centres. In idiopathic epilepsy no constant anatomical change has been found in the nervous system, but such changes as have been discovered have generally affected the cortex of the brain. The lesion of idiopathic epilepsy is probably a molecular disturbance. In each epilepsy there is an area of grey matter in some portion of the cerebrum which is so abnormally nourished that it occasionally reaches very high tension and highly unstable equilibrium. It occasionally discharges, or is discharged, by some eccentric irritation, or during some general bodily disturbance, as, for example, that attending fright. The experimental researches of Ferrier corroborate the views formed clinically by Jackson, and the application of electrodes to motor-centres in the brain produces a discharge of nerve force; which is preceded, however, by an instantaneous increase in the vascularity of the part, and followed by motor movement. The nerve energy stored up in the cerebral cells may be discharged from some emotional cause, as fright; or from some irritation within the system, as a tapeworm, or a decayed tooth, or as the convulsions of teething, or still more ovarian or uterine disturbance; or again the discharge may result from some high tension, from excessive or abnormal

nutrition in the hemispheres themselves, especially in a brain naturally unstable. There is a discharge similar to, if not identical with, that of other centres in fits of rage or in hysteria; where the explosions assume another expression. From this brief allusion to the conditions under which epileptic convulsions arise, a light is thrown upon the lines of treatment to be adopted in each case of epilepsy.

It is obvious that one great matter is to relieve any state of tension, and to lessen mobility in the nervous system, and so to reduce the tendency to discharges from any exciting cause. Consequently it becomes desirable to administer agents which will lessen nervous activity while controlling the circulation, and especially the encephalic circulation. Such an agent we possess in bromide of potassium. It gives steadiness to the nervous system by lessening its activity, and still more its excitability, and so diminishes the tendency to give forth discharges from high tension as well as from exciting causes; and we can therefore comprehend its immense value in the treatment of epilepsy. That the employment of bromide of potassium has changed the aspect of epilepsy, or at least profoundly modified it, can scarcely be denied. In many cases the fits can be kept away for almost any length of time by its free use; though they not rarely return soon after its withdrawal, to disappear again with the readministration of the remedy. No neurotic agent we are yet acquainted with has received such universal acceptance in the treatment of epilepsy, and held its ground so firmly, as bromide of potassium. It is quite certain that numbers of other agents have been vaunted as useful and effectual, and after a temporary favour receded into comparative obscurity; but the bromide increases steadily in favour even with the most sceptical. It is not only that it lessens nervous action in the centres, but it diminishes nerve conductivity, and so is useful in two ways. It diminishes the tendency to explosions; and it lessens centripetal impressions coming in from a distance.

The treatment of epilepsy is not, however, to be confined to the administration of bromide of potassium, no matter how freely. There are other matters to be considered. There is the reduction of tension in the nerve-centres by modifications

of nutrition. In many epileptics the discharge is preceded by a ravenous appetite and the consumption of large quantities of food. It is impossible to shut one's eyes to the effect such supplies of food will have in adding to the vascularity and nutrition of unstable nerve-centres. There is, too, something in nitrogen which increases nerve activity, and renders nerve-tissue more explosive; and free quantities of nitrogenized food add to nerve susceptibility. A non-stimulating diet is distinctly indicated in many cases. A certain amount of normal discharge of nerve force is not unimportant as well. Brown Séquard's guinea-pigs, which had frequent fits in confinement when abundantly fed, lost much of their convulsive tendency in liberty with a different regimen. From such considerations we can see a probable relation at least betwixt nervous discharges and excessive nutrition in unstable brains, especially where there is much nervous inactivity. Exercise in the fresh air, with a regulated diet, will do much to reduce the liability to such discharges in many brains.

On the other hand, we know that convulsions are apt to occur, if they are not always present, in sudden hæmorrhage. Consequently we can see how, under other circumstances, tonics, chalybeates, and liberal supplies of good food may be beneficial in restoring some brains to their normal equilibrium. Many cases are permanently benefited by good nutrition, just as much as a lowering of the diet is required for others. Of the tonics most resorted to iron is one of the first, often beneficially given with bromide of potassium; zinc, silver, or gold are also commonly used. In true epilepsy Hughlings Jackson follows Brown Séquard in thinking chalybeates contra-indicated. Phosphorus is sometimes useful; whilst the vegetable tonics, as quinine and strychnine, are also serviceable. Other agents of neurotic character than the bromides are also useful in some cases, as belladonna and cannabis indica; but it is impossible yet to discriminate the cases to which they are suited or to lay down any rules for the administration of these two agents in epilepsy proper or epileptiform seizures.

Then again there comes the matter of the removal of irritant or other exciting causes. Extrinsic causes of such nervous explosions are to be guarded against and avoided, as sources

of fright, of excitement, &c. All irritant matters within the organism itself must be attended to and relieved. Thus intestinal or other irritation must be removed, and it is ever well to keep up the action of the intestines. A loaded state of the bowels is a great provoking cause of epilepsy in unstable brains. A tapeworm also has been known to cause epilepsy; and the recurrence of the fits was the indication of the presence of another worm in the same individual. The sexual organs are very commonly indeed intimately associated with epilepsy. Thus we often see it in women at or about their menstrual periods. It is not only that in unstable brains peripheral irritation sets up centric discharges very readily; there seems something in the brains of epileptics which leaves them more at the mercy of their passions than other persons are. In such cases bromide of potassium or ammonium are useful in every way; especially along with measures which keep the pelvis free from load or congestion.

It is a matter of importance to attend to the secretions and excretions. Especially is it necessary to attend to the elimination of waste nitrogenized matters. The relations of nitrogen to nerve-explosions, as well as nerve-explosiveness, are well seen in the convulsions of uræmia. A uræmic condition, especially when it occurs in anæmic subjects, is commonly accompanied by convulsions in normal brains; and consequently the disturbing effects of nitrogenized waste upon unstable brains becomes very intelligible. Free purgation with potash, laxatives, warm baths, and increased action of the skin, as well as kidneys, are indicated. In many cases counter irritation is found of service, and Romberg gives some very striking cases. Brown Séquard and Van der Kolk also believe in the good effects of counter irritation. An attack of eclampsia cannot be distinguished from a true epileptic seizure. A fit of convulsions may arise from a number of different causes. Idiopathic convulsions are of frequent occurrence during the first two years of life, and the febrile convulsions which mark the onset of one of the acute specific diseases are equally familiar to us. Reflex convulsions may be the result of some irritant in the intestinal canal, or even of the presence of a calculus in the pelvis of the kidney. Uræmic convulsions in children are usually associated

with scarlatina nephritis, whilst in the adult puerperal eclampsia is commonly a form of uræmic convulsion. The treatment to be adopted is practically identical with that of epilepsy, due regard being paid however to the exciting cause and to the possibility of removing any existing source of irritation.

The night terrors and the convulsions of children have to be treated on the same principles as epilepsy; and in them the condition of the intestinal canal is all important, as the reproductive organs exert comparatively little action at this period of life. Bromide of potassium is the most useful agent to directly control the nervous system in these cases.

§ 219. Hysteria is a troublesome and complex affection, and the brief summary, here alone possible, is to the effect that it is the outcome of a susceptible nervous system, often acted upon by the associations, mental and other, connected with the reproductive system; but by no means necessarily so. It is most common in spinsters from puberty to about six-and-thirty; but may be found in highly-strung nervous systems under totally different circumstances. In the case of spinsters it often ceases with marriage, and rarely persists after the advent of motherhood. In many cases the patient manifests a morbid self-consciousness, and is entirely absorbed in herself, her interests, and her sensations. In such cases the symptoms classed as spinal irritation are frequently found. This is the commonest form of hysteria: but it has myriads of manifestations. Joint-disease, paralysis, hyperæsthesia, &c., are amongst its mimicries; but it will simulate peritonitis, or at other times explode in oft-repeated convulsions. In approaching hysteria from a therapeutic point of view, it is necessary first to discriminate its causal associations and its surroundings. If occurring in a person of high nervous development and mental culture, it is probably intimately related to some emotional disturbance not necessarily involving the passions. In such cases camphor, hyoscyamus, or other calmative neurotics, are indicated, with rest and the avoidance of excitement. When associated with ungratified physiological aspirations in the spinster or the widow, hysteria is almost always accompanied with, if not caused by, ovarian fulness and congestion; indeed in many cases it is the outcome of some disturbance in the

ovary, or uterus, acting upon a very sensitive emotional, or even unstable nervous system. The impressions arising therefrom either cause cerebral disturbance, or disturb motor or sensory processes, or influence the body temperature. In such cases it is necessary to unload the pelvic viscera by sulphate of magnesia with decoction of aloes, pushed pretty freely, and to give bromides. On no account must the alleged incapacity to empty the bladder lead to manual measures of relief. Quiet surroundings, with judicious, but not ostentatious kindness, and a firm bearing in those around the patient, are absolutely necessary. If the patient's mother is an unwise woman all treatment will be found ultimately to be useless, or next to it. The ordinary measures of unpalatable remedies are of little real service. The whole list of anti-hysteric remedies—such as musk, castor, valerian, assafœtida, and the like—appear to have this one property in common, that they do no good, and delay the real treatment of the case, which is not one of "nauseous gums," but of mental, moral, and social management. In minor cases nature's remedy—a good cry—often is of much service and gives great relief. The *tout ensemble* of the hysteric female is unfortunate, and requires the utmost skill for its correct management or amelioration. Firm and well-defined measures alone are serviceable; and a hesitating, vacillating adviser may soon render a case incurably bad which, under a wiser counsellor, might have been largely amenable to treatment. In hysteric convulsions a deluge of cold water is useful for its moral as well as its physical effects; but the most effectual plan, and least troublesome, is to hold the mouth and nose forcibly, until a vigorous inspiration is at last attained, which usually terminates the fit. Inhalations of nitrite of amyl contain much promise.

Catalepsy is commonly simply a manifestation of hysteria, but sometimes it is associated with gross cerebral lesions. The attacks usually come on quite suddenly, but they may be preceded by headache, and possibly by a general sense of discomfort. There is considerable rigidity of the muscles. The patient is usually more or less sensible, but sometimes consciousness is entirely lost. The attacks vary much in duration, and may last from a few minutes to several days.

In what is known as trance, the patient remains often for days together without eating or drinking, and in a condition of insensibility, very much like a hibernating. In ecstasy the patient is insensible to outward impressions, and the mind is absorbed in the contemplation of some fixed idea, usually of a religious nature. In somnambulism, the patients during a state of sleep walk about and perform acts of the most complex description with as much ease as if they were fully awake.

In connection with these obscure disorders of the nervous system, it may be interesting to consider briefly those conditions which Sir James Crichton-Browne has described under the title of "Dreamy Mental States." Many of our most eminent writers refer to them, and describe them as being a universal human experience. Hardy says—"Everybody is familiar with those strange sensations we sometimes have, that our life for the moment exists in duplicate, that we have lived through that moment before or shall again." Rossetti in *Sudden Light* refers to this condition when he says :—

"I have been here before,
But when or how I cannot tell :
I know the grass beyond the door,
The keen sweet smell,
The sighing sound, the lights around the shore.

"You have been mine before,—
How long ago I may not know :
But just when at that swallow's soar
Your neck turned so,
Some veil did fall,—I know it all of yore."

As Crichton-Browne says :—"The difficulty of getting information about these dreamy mental states is considerable, for those who have experienced them generally manifest a disinclination to talk about them, from a not unwarrantable suspicion that they are somehow morbid in their nature, and those who have not experienced them cannot comprehend what is meant by them, and often treat questions bearing on them with a levity like that of the young American who, when interrogated respecting them, replied that he never lighted a cigar without the deepest conviction that he had done the

very same thing not once but many times before. Still a little careful investigation as to their distribution will, I am satisfied, conduct to the conclusion that dreamy mental states, although widespread, are by no means universal and cannot with propriety be called normal phenomena. The fact is that they emerge only at a certain stage of mental evolution, rarely occurring in a child under eight years of age or in a man or woman of less than average mental development. They are not themselves a part of the evolutionary process, but one of the accidents by which it is attended. They do not present themselves before that stage of intellectual growth at which the capability of entertaining abstract ideas is attained, and they find no place in a scheme of natural and organic mental expansion, but are an interference with the *chiaroscuro* of perfect mental health, and the first step a series of changes which, extending through many degrees of mental dissolution, ends in complete coma or obliteration of mind. I shall hope to show that these dreamy states, so far from being normal even in their slightest and simplest form, and occurring in presumably healthy persons, involve disorder of mind, trifling and transient no doubt, like cramp of a muscle, but disorder nevertheless, dependent on a defect of consciousness, in one direction, indicated by vagueness as to present surroundings, and an increase of consciousness in another direction, indicated by the too vivid revival of former surroundings. There is in them a negative element in the loss of control of the highest centres, and a positive element in the raised activity of other nervous arrangements, permitting of new cerebral combinations, somewhat akin to those which take place during the activity of the imagination and flights of genius. If the sense of beauty is vision raised to a higher power, a dreamy mental state is memory diving to a lower than its accustomed level and bringing to the surface deeply submerged personal annals, or even still more unfathomable ancestral traits. A dreamy state it may be conveniently called, and dreamy in some aspects it undoubtedly is, and yet, strictly speaking, it is not comparable to a dream, for it involves a residuum of object consciousness, larger than a dream contains, and a volume of subject consciousness to which a dream rarely reaches. It has peculiar features of its own, and stands in the same relation to a

dream that the darkness of an eclipse does to the more frequently recurring darkness of night."

§ 220. Neuralgia is a most common ailment, indeed one of the most universal plagues of humanity. It occurs in two pretty distinct forms, (1) that of anæmia and debility; and (2) that of degenerative change, especially in connection with lithiasis. In the first form Romberg's idiomatic utterance that "Pain is the prayer of a nerve for healthy blood"—that is healthy in quantity and quality both—is almost universally true. In order, however, to discriminate between neuralgic and other similar pains the four rules of Anstie must be borne in mind. First, the one-sidedness; except in severe cases, where the pain becomes sometimes bilateral. Secondly, its gusty character; not a steady, continuous pain, but coming in ebbs and flows. Thirdly, the association of the pain with physical depression, imperfect nutrition, or exhaustion. Fourthly, the effects of tonic treatment. In addition to these the pain is often sudden or fitful in appearance, with intervals of complete freedom from pain; except in advanced cases, where the intermissions become more or less lost. It also follows the track of sensory nerves. It is often associated with a family history of neuroses of various kinds. Often, too, there are present sensitive points along the affected nerve, the tender spots of Valleix. One of the very commonest forms of neuralgia is the intercostal, the pain in the side, or under the heart, so frequently complained of by women. This form is most commonly associated with leucorrhœa, next with suckling, and then with excessive tea-drinking or dyspepsia; in some cases all these are found together. Perhaps intercostal neuralgia points more strongly than any other form to the absolute necessity for the removal of all debilitating or co-existing conditions producing exhaustion or irritation; as well as the administration of food, tonics and chalybeates. The cure of the leucorrhœa, and its frequent accompaniment, menorrhagia, is the essential step in one case; the abandonment of suckling is necessary in another: and the avoidance of tea is as requisite in a third. What is true of this form of neuralgia holds good in all others, facial or lumbar. It is useless to attempt to feed up the patient if drains upon the system are left unchecked, or sources of nervous

exhaustion are permitted to remain. Every form of debilitating action, mental and bodily, should be removed. Then iron, with tincture of gelsemium or arsenic, quinine, and strychnine, are the chief agents to be relied upon. These drugs may be given in combinations of two or more with advantage. Then comes the absolutely necessary fat. The influence of fat over neuralgiæ is unquestionable. When we remember that nervous tissue consists so largely of fat and phosphorus, it can be no matter for surprise that fat in all its forms, and phosphorus should be so valuable in the treatment of conditions of nerve debility. Phosphorus may be given in any of its forms; but as phosphoric acid, either free, or in combination as a phosphate, it is least useful; and as free phosphorus, or in the form of a hypophosphite, is most serviceable. Fresh air, exercise, and invigorating surroundings are ever of service, and the avoidance of surroundings of opposite character is equally desirable. Such are the means of cure. There are also palliative measures. Opium is of use to procure sleep; while it may be used locally. The hypodermic injection of morphine, so as to secure local and general effects, is a great boon alike to patients and practitioners. Chloral is of little use, and is not desirable. It is too depressant, and lowers the nervous system too much. For local relief aconite is most useful, in the form of a strong tincture, or liniment, with or without belladonna. Often this may be painted on merely, and yet give effectual relief. At other times it is better to use a more powerful measure, especially in sciatica. For this end aconite liniment, two drachms, and an equal quantity of belladonna liniment, may be mixed with half-an-ounce of glycerine, or better still, treacle. This does not readily dry. The mixture must be spread liberally on a strip of lint of two or four folds in thickness, and the prepared lint applied along the course of the affected nerve; covering the lint with oil silk, sufficiently large to overlap the lint half-an-inch all round. This can be secured by a roller bandage, or the leg of a stocking; and left on for hours. When desirable a new application can be put on; but it is even better to spread some more of the mixture on the original lint, until it becomes completely saturated, and then reapply it. This is a powerful local measure, often of incal-

culable service, and can be used along with general measures, no matter what the form of neuralgia.

Neuralgia may be rheumatic, or gouty, or degenerative. As such, it is most commonly found in advanced life and in those of a nervous diathesis. It is not incompatible with great vigour in such persons; but is more commonly found associated with overwork. Such forms of neuralgia are generally best treated by remembering the associations, and giving potash and colchicum along with tonics and chalybeates. In such cases the desirability of a diet containing much fat and little nitrogenized food becomes of greater urgency than in other neuralgiæ even. Alkaline purgatives are useful, and in atonic cases arsenic may be added with advantage. After the *materies morbi* has been got rid of by such measures, then a cautious administration of potash and iron with quinine may be commenced; and for some time the evacuant and tonic measures may be combined and blended ere tonics alone are given. In these forms of neuralgia local measures are more satisfactory than in pure neuralgia—which is essentially a disorder of adynamic character.

Local palsies and local spasms must be therapeutically considered in relation to their exciting cause and special associations.

Electricity can have no lengthened notice here, as its use obtains chiefly among those who do not require the perusal of a work like the present. It is useful diagnostically as well as therapeutically. As a remedial agent it is often most useful: mostly in localized nerve affections, least so in maladies of cerebral origin. If the two poles can be placed on each side of a nerve lesion, then the current may rouse the nerve fibrils, and do good. If used too soon much harm may follow its employment. In all cases it may be used to maintain the activity and nutrition of muscles, so that they are kept in such a condition as to resume action as soon as nerve currents once more reach them. It may also be used in cases of arrested development, as in incapacity to walk, or backwardness in walking, in infants. And it is equally serviceable in cases of loss of power from muscular atrophy; but here good nutrition is absolutely essential to improvement.

The Weir-Mitchell treatment is a combination of absolute

rest, crude electricity, coarse rubbing—dignified by the name of massage—and over-feeding. It may be useful in cases of hysteria. It is less commonly employed than formerly. The ultimate effects are often most unsatisfactory. The ordinary "massage establishment" is simply a lupinar, and the masseuses, who call themselves "sisters" and "nurses," are competent to give lessons to the heroine of Lesbos.

CHAPTER XXII

PUBLIC AND PRIVATE HYGIENE

§ 221. *Public Hygiene.*—As well as the cure of disease, there is the matter of its prevention;—a very important matter, and one now much better recognized than in times past. The conviction that prevention of disease is a better method than cure, even if cure were invariably attainable—which it is not—is now generally prevalent. This is partly the result of better general education and the spread of information; but also not a little due to the fact that the wear and tear of life, the direct consequence of the pace at which we live, is such that few systems are fit to bear fairly well the test of acute disease. This last applies rather to the dwellers in towns than the denizens of hamlets and villages; is more true in the hives of industry than in the scattered population who follow agricultural pursuits. The pace at which we now live is much faster than that of our immediate predecessors, nor is there any prospect of immediate retardation; though it may well be questioned whether man will continue indefinitely his present feverish pursuit of wealth. It is not merely to make ends meet that man, and especially the Anglo-Saxon, struggles so strenuously and persistently; the early exertions are continued and, if possible, increased, in order to make a fortune—for nowadays it would seem that the prevalent opinion is that without wealth life is scarcely endurable. A truer and juster idea of happiness and comfort will ultimately obtain; and man will find himself more agreeably as well as more profitably engaged in other questions than the gain of mere material wealth. It is only of late years that wealth has been readily attainable by any considerable number of people;

and its dazzling fascination blinds mankind at present to the evils and the drawbacks which underlie the alluring surface. Experience, however, is being rapidly furnished to demonstrate that wealth is not the royal road to happiness; that money-making may warp the intelligence and dwarf higher qualities; that in material wealth we are not to find unalloyed good. At present, however, we live in an age which is pretty universally finding out the powers of endurance of every individual by the searching test of over-exceeding them. It is not in commerce only that this high-pressure existence obtains: in every walk of life now there is a general pushing forward; a great deal is required now to enable the individual to hold his own: how much more then is required in order that each may pass his fellows in the race of life? It is the sustained rate of life-speed which requires that the individual shall lose none of his headway by intercurrent sickness, that gives a stimulus to public hygiene. Man in his swift pursuit of wealth does not wish to lose ground by sickness. He takes care of his health in order that he may grow wealthy; but he does not grow wise in proportion, and his care of himself in many ways is more than counterbalanced by his gross neglect of himself in others. We are all inclined to look very sharply after any sources of ailment, except the now common one of physiological bankruptcy, by too frequent and persistent drafts upon the body force. The large increase of heart-disease, and still more brain-disease, amidst the well-to-do classes, of late, is the direct outcome of our impetuous excitement and anxiety, of "wear and worrit."

Such, however, being the case, it is desirable that the medical man should recognize the fact, and be prepared accordingly to advise his patients.

§ 222. First, then, about the house in which we live. Much ill-health is the direct consequence of ill-built, or ill-planned houses; of low rooms, of insufficient sunshine; and, still more, of bad ventilation and worse sewerage. The primitive arrangements of nomadic tribes are utterly unsuited to the existing circumstances of the day. The magnificent sanitary arrangements of past civilizations were lost during the dark ages. Cloacal arrangements were entirely lost sight of, the streets were sewers, while water was drawn from wells immediately

underneath and amidst this filth; the floors of houses were strewn with rushes, amidst which refuse and waste accumulated, a fresh layer of rushes merely hiding the nastiness it concealed, but did not remove; in the churches lay the decomposing dead, poisoning the living; crusaders ignorant of, as well as fanatically disregardful of all sanitary laws, spread pestilences in their marches; plagues and pestilences decimating, nay, depopulating whole territories, as any one who has read Haeckel's *Epidemics of the Middle Ages* well knows, were constant and persistent; while the ordinary heavy death-rate at times ascended to a terrible fatality. From such a state of matters we are now awakening; not, however, without repeated reminders in the forms of severe outbreaks of preventible disease; and are setting to work seriously to improve matters, and to entertain the question of hygiene, and to recognize the value of sanitary arrangements. Houses are now built with careful regard to their position, to the foundations, to the regular supply of water and of air, and the proper removal of all waste and fæcal matter.

The importance of sunshine to the health of humanity is now recognized. We know from barracks how lack of sunshine and ill-health go together. Then we also have learnt that spacious rooms, giving a large cubic space to each individual, are of little avail unless that air be changed repeatedly; and for this end ventilation is imperatively necessary: by too carefully closing every aperture all the evils of bad ventilation are artificially secured. Not only do many of the wealthy classes inhabit day-rooms too carefully heated, the air of which is laden with the products of combustion; but the advantages of large bedrooms at night are lost and neutralized by burning gas for hours in these rooms in the evenings, closing every crevice against a draught, and then often, too, lighting a large fire. By this means the oxygen of the room is largely consumed until the fire dies out; leaving the human being in a sleep which is partial carbonic acid poisoning: there are no means for the renewal of air; the draught caused by the fire is no longer existing; and under such circumstances man seeks to fit himself for days of toil and exhaustion. The storing up of oxygen at night, as Voigt has shown, for the

needs of the waking hours, so necessary and desirable, is as far as possible prevented by the very individuals who need it most. How far such nocturnal storing up of oxygen by the humbler classes, whose houses do not admit of proper ventilation, is simply impossible, it is not easy to say: their neglect of sanitary arrangements is not merely an outcome of indifference, but is largely the unavoidable result of poverty. Plentiful supplies of fresh air are desirable for every living thing; and if, under certain circumstances, they are unattainable, in a great many other instances their absence is the result of ignorance or indifference. In a great many affections of the lungs the disease arises from mechanical irritants suspended in the air; and in all cases of disease, and especially chronic disease of the lungs, the mischief is aggravated by the respiration of such mechanical irritants.

Overcrowding is undoubtedly responsible for a large proportion of cases of consumption. The respiration of impure air debilitates the vital powers, enfeebles the nervous system, depresses the appetite, deranges the secretions, and leads to the retention of effete matters in the blood. "In London the worst examples of overcrowding are met with, not at the East End, but on the large ducal estates, and in what were at one time fashionable streets. When the tide of fashion turns, the large houses are taken by lodging-house keepers, who make a living by letting apartments. After a time the street 'goes down,' and the rooms are let separately, each room, in all probability, being occupied by a family. The doors of communication between rooms on the same floor are plastered up to ensure privacy, and from that time through ventilation is an impossibility. When the occupant goes out he locks his door to prevent his things being stolen, so that the partial ventilation which might be ensured by an open window and an open door is lost. Moreover, the sanitary accommodation is bad and deficient, for the closets, which would have been sufficient for one family, are not enough for a dozen or more families herded together in one house. The landlord has wealth and power on his side, and no appeal to him from impecunious tenants would be likely to receive much attention." (Murrell, *The Prevention of Consumption.*)

The importance of sufficient ventilation in our public buildings is not yet sufficiently recognized. Churches, theatres, places of public entertainment, and picture-galleries, are all liable to produce distinct and tangible effects, as faintness, headache, malaise, upon some individuals, who are very susceptible to bad ventilation and foul air; while similar more persistent conditions are produced in less susceptible individuals when chronically exposed to such conditions. In railway-carriages, in tramway-cars, and in omnibuses, this disregard to the necessities of the system in the way of a sufficient supply of oxygen is painful to see, as well as to bear; for those who do understand the subject. An abject fear of colds from free supplies of air absorbs all the attention of many individuals, and renders them forgetful of other evils which do not lie so immediately at the surface.

§ 223. The importance of a good supply of pure air is not nearly so well appreciated generally, as is the necessity for free supplies of pure water. Mankind has ever sought to get a clear and sparkling water, and objects to it if its smell be unsavoury; but of the finer and subtler contaminations he has remained, until recently, profoundly ignorant. Water is required not only for drinking but for cooking food, the preparation of tea, coffee, and other beverages, for baths and personal cleanliness, for washing cooking utensils, linen, floors, and other articles, and also for flushing out closets. An ordinary sponge-bath holds about three gallons, whilst a full-length bath holds from thirty to forty gallons. It is believed that in London the supply averages 200 gallons a day for each house, or 40 gallons a head, but in many provincial towns a more liberal allowance is made. Rain-water, carefully collected, is the purest natural water, and being soft, from the absence of salts of lime and magnesia, is well adapted for washing and cooking purposes, although it is not especially palatable as a drinking-water. River-water varies much in composition, but always contains more solid matter than rain-water. It is often good and palatable, but the possibility of sewage contamination in the neighbourhood of towns must not be forgotten. Spring-water is the best for most purposes, although rain-water is often preferred for washing and cooking when the spring-water

is hard. Surface-wells are liable to be contaminated with impurities of all kinds, but water obtained from wells fifty feet or more deep is usually of excellent quality. The curious relationship of cholera to water-supply is of much interest. In one outbreak in London 37 per 10,000 of those who drank the water brought from the Thames near Ditton died; but 130 per 10,000 of those who drank water brought from the Thames at Chelsea died. Here is an unquestioned piece of evidence that a constantly impure water-supply leaves the system less equal to resist an epidemic form of disease. It is not only that water is often the direct source of disease, as diarrhœa and typhoid fever; but it is commonly a cause of a gradual, steady deterioration of the health, which is revealed by the inability of the system to withstand the strain of some acute intercurrent disease. If temperance, or rather teetotalism, be a good thing, its advocates ought at least to secure their adherents from the dangers to which they are thus exposed; for outbreaks of typhoid fever have been found to seize the water-drinkers of a house, while the beer-drinkers have been free from attack. In our relations to the public as medical men we must be impartial, and sentiment must not warp our intelligence; we must be as ready to acknowledge the dangers of water-drinking, as we are to admit the destructive consequences of excessive indulgence in alcohol. It is not in towns only that the evil effects of a contaminated water-supply is felt; indeed they have been too rudely awakened by irrefutable facts to be any longer oblivious to the consequences; but also in the country, where wells lie close to sinks and middensteads; where the village stream furnishes to those at one end of the hamlet as a beverage, the sewage of the houses placed further up. In few villages is the water to be trusted, unless it be the product of some well-cared-for spring, or some exceptional well. Repeated outbreaks of typhoid fever have accumulated evidence on this matter which is sufficient to convince the most sceptical.

§ 224. Closely connected with our water-supply is that of our sewage. When men live in sparsely-populated districts, sanitary appliances are not required; the excreta is returned at once to the soil, where, so far from being detrimental, it acts

as a fertilizing agent, and is a distinct boon. This is possible only when people lead an agricultural or nomadic form of life; but when they are collected together into vast communities, as they are in our cities and towns, some method of disposing of the sewage material has to be devised, in order that the soil and air and drinking-water may be preserved from contamination. The fact that in large communities the water-carriage system is often held to be the only practicable one, and the other fact, that if the sewage were entirely removed from our waste water-supply, the sewers would no longer receive the benefits of being flushed by the waste water in rainy seasons and in thunderstorms, cause the question to be more complicated than it would be, if the axiom "the rainfall to the river and the sewage to the soil," were capable of universal application. As it is, the two matters are bound up together in such a manner that they cannot be readily separated. We know, only too well, that many outbreaks of disease are occasioned by our water-carriage of sewage. Not only is sewer-gas apt to diffuse itself from the water-closet trap, and so to poison the inhabitants of the house; but leakage from sewer-pipes is apt to penetrate the water-supply, and so cause disease. Especially is this the case where the nitrites of the fæcal matters have eaten through the iron pipes, and the water-supply is intermittent. When the water-supply is cut off sewer-gas finds its way into the empty tubes, which exercise a suction action as the water runs out of them; and then follows disease. If there is typhoid fever in the town the poison will get universal diffusion when the water is again "on," and an outbreak will result. The possibilities of water contamination by our sewage are so numerous that it would be simply impossible here to indicate a tithe of them. The publication of sanitary journals is doing much to familiarize, not the profession only but lay readers, with the manifold dangers which ensue from neglect of sewage and sewerage. The removal of fæcal matter by the use of the earth-closet is perfectly feasible in large establishments, such as sanatoriums, where the system of water-carriage is likely to lead to the pollution of neighbouring streams, or where public institutions are liable to actions at law in consequence of their sewage, or in private houses, for indoor arrangements in the

country: but as a means for use in comparatively small towns even, it must be pronounced unsuited and impracticable. That towns, however, can go on polluting adjacent rivers and poisoning the water for their neighbours, as of yore, is quite out of the question; especially in our manufacturing districts. There are difficulties in the way, and vested interests to be attended to; but, nevertheless, towns where wealth is made must set apart a portion of that wealth for the removal of their sewage; and of all plans the system of sewage irrigation over meadows seems the best and most feasible, and to possess the maximum of advantages with the minimum of drawbacks. By the different systems of filtration and sewage of meadows combined, there seems a prospect of getting rid of sewage in such a manner that the fluid shall fertilize the land, and leaving there its fæcal matters, return through the purifying soil to the river a fairly pure water. In all large plains, studded with hamlets and towns, the contamination of water with sewage, in spite of everything yet known, is such that good filters in private houses are absolutely necessary.

The sewage difficulties are such in every health-resort as to, as soon as ever any place becomes popular, cause the greatest difficulties. Look, for instance, to the health-giving valley of the Wharfe, where Ben Rhydding towers over one of the healthiest of districts, near pure air of the most bracing character, with limpid water from far-stretching moorlands; and yet Ilkley is now a town with all the difficulties of aggregations of individuals. Whether in such districts as Harrogate, Ilkley, &c., the system of only permitting so many acres, when being sold, to each house and no fewer; so that for the wealthy there is a villa and grounds; and for the less wealthy sanatoriums under professional and skilled superintendence, with every possible sanitary arrangement,—would be successful in getting rid of many of the present drawbacks, or not, it is impossible to say. It is hard that the poorer members of the community should be cut off from the advantages of health-resorts; and yet the conversion of rural districts of that character into towns of second-rate lodging-houses, with their sanitary defects, is a questionable means of bringing such health-resorts within the reach of these persons.

§ 225. The causes of diseases associated with decomposition have been held to be germs, whose origin and growth putrefaction encourages; or else to be tiny particles, in atomic activity, from one organism wafted to or otherwise brought in contact with other organisms, in which they set up changes similar to those being undergone by themselves. As to which of these hypotheses is correct, or whether the true explanation has yet to be discovered, we are not in a position to say; but this we do know, that a large series of agents, known as disinfectants and antiseptics, possess the property of arresting the activity of the infecting media. That carbolic acid added to the offensive pea-soup stools of a typhoid-fever patient takes away the offensive odour; and not only that, but renders them innocuous, we have every reason to believe. It must not, however, be supposed that the offensive odour is the poison; but, at the same time, an odour of a disagreeable character is usually found present where septic poison is being generated. By his sense of smell man is warned to take precautions; but the stench is not itself poisonous, as is seen in the offensive odours of tanneries, for the popular belief is that the neighbourhood of a tannery actually confers healthiness. Wherever there is decomposing matter, especially nitrogenous, there is a disagreeable odour evolved; and with such decomposing matter certain fevers, and especially typhoid, are associated causally. Murchison, indeed, called typhoid fever "pythogenic fever," or "fever bred of putrefaction," and some French writers regard it as procurable at will. In consequence of the vast accumulation of evidence that septic poisons are causally connected with decomposition—an amount which no ordinary mind can resist—a great stimulus has been given to the subjects of disinfectants and antiseptics. These agents, whether derived from vegetable or mineral sources, possess the property of uniting with bodies in a state of atomic activity, and forming with them stable compounds; which, as such, are inert, and so free from dangerous qualities. The decaying or decomposing matter forms a species of base or basyle, in union with the arresting acid, as seen in the use of carbolic acid, for instance. In permanganate of potassium, however, a diametrically opposite action takes place. Here the active oxygen, liberated from the fluid, quickly procures entire and

complete oxidation of the particles in atomic change; and so does away with their dangerous properties.

It is a matter of no small importance for the practitioner to have distinct ideas on the subject of disinfection, as at the present time the subject is invested with somewhat of novelty, as well as possessing merits of its own. There are various forms of disinfectants, some more suited to one requirement, others better fitted for different needs. To take the disinfection of drains and sewers first: here is required, as regards the fluid contents of the channel, a fluid form of disinfectant; and a suitable form is found in perchloride of mercury, in a solution of sulphate of iron, in carbolic acid in solution, or chloride of zinc. Such fluid should be poured pretty liberally into the offensive drain. At the traps, or other openings, carbolic powder may be used with advantage. For the disinfection of privies, urinals, the arrest of offensive odour in water-closets, "L.G.B." soloids, or the carbolic powder, are very useful. The latter should be used liberally and freely. It has the advantage of liberating the carbolic acid gradually; and consequently is useful to meet a persistent giving off of putrefactive matter, or offensive gases. The "L.G.B."—or Local Government Board—soloids consist of perchloride of mercury, hydrochloric acid, and aniline blue. One soloid dissolved in a pint of water makes a 1 in 1000 antiseptic solution, which will thoroughly sterilize the excreta of infectious diseases. This solution is used to deodorize and render harmless the dejecta from typhoid-fever patients. In the country these dejecta might, as speedily as possible, be buried at some distance from any water-supply, where the antiseptic action of the earth would soon render them free from all danger. If in towns, they ought to be thoroughly disinfected ere being committed to the water-closets. A certain quantity of some soluble disinfectant might be added to the water in the pan of each closet, or some powder scattered in with advantage. A great source of danger in connection with the water-closets is the liability to so introduce sewer-gas into the house. When the water-supply, or waste-pipe of closets in the upper part of the house are in communication with those beneath, the rush of water to the lower outlets causes a

rush of air to take the place of the vacuum so made, and sewer-gas often is thus introduced into a house. At other times, especially in houses at the summit of each sewage-area, the pent-up sewer-gases rush up the waste-pipes, and from the water-closet infect the upper rooms of the houses. Especially is this the case if the sewerage opens into a tidal river. The rising water fills the outlet, and then compresses the pent-up air in the sewers; under such pressure the sewer-gases penetrate where under other circumstances they could not enter. The waste water-pipe should be broken in its course, so that sewer-gas may escape without rising into the house; or a shaft should be carried up and out beyond the roof, so that if pent-up sewer-gas should rise in the pipes it would find a ready outlet into a comparatively safe external air.

So much for general disinfection. We may now come to the question of more special disinfection. Supposing that there is already a case of fever in a house, the first thing to be done is to isolate the patient. No one should see him except those in immediate attendance upon him. All food should be brought into another contiguous chamber, and be removed from thence to the sick-room by the attendants; and all refuse, &c., should be conveyed by the nurses into this room and thoroughly disinfected, and then it could be removed without fear of infection by the ordinary servants. Thus all direct communication betwixt the sick person and the household would be avoided. All soiled linen should be immersed in a disinfectant solution, all slops disinfected, and the clothes of the nurses should be disinfected on their leaving the room. The best disinfectant for soiled linen—sheets, handkerchiefs, &c.—is the L.G.B. solution, prepared according to the method already indicated. The solution should be made in a wooden tub into which the various articles can be thrown at once. After being allowed to soak for a couple of hours, they should be thoroughly rinsed in a stream of water. In order to prevent the fever-poison passing out from the sick-room when the door is opened, a sheet saturated with some liquid disinfectant should be hung over the doorway; and be frequently moistened with the disinfecting solution. Within the room Sanitas might be scattered about

freely, or some solution of carbolic acid, or chlorozone. All unnecessary articles ought to be removed from the room, as they might prove carriers of infection.

As to the patient, chlorate of potassium in lemon-juice (very palatable), or sulphite of sodium, may be administered internally; and if the case be small-pox or scarlatina, the patient may be washed with Wright's tar soap, or Sanitas, or carbolic-acid soap. At the latter stages, when the dried crusts of small-pox or the exfoliated epithelial scales of scarlatina constitute special sources of danger, a carbolized cerate, or oil, should be rubbed over the body, and the patient should be bathed every day or second day, and the exfoliated matter removed; then the disinfectant should be smeared over the whole surface again, and at the regular time the bath be resorted to. By such means the infective matter given off from the surface is rendered harmless. It is of as much importance to disinfect the cutaneous matters in these ailments, as it is to disinfect the stools in typhoid fever.

After the convalescent patient has left the sick-room it ought to be cleaned out; everything being removed, the empty room should have its windows closed, and then, on a thick layer of sand, should be placed a red-hot iron plate, and upon it sulphur. The fumes of the burning sulphur then fill the room, which should be kept closed for twenty-four hours. After that it ought to be scoured out thoroughly, and then the sulphur-fuming ought to be gone through again. After this the windows should be opened for a couple of days, and then the room is safe enough. If necessary the woodwork could be scraped and repainted, the ceiling whitewashed, and the wall-paper renewed, in addition.

The articles which are in the room might remain over the first fumigation, if they could not otherwise be well disinfected. If in the country, they should then be exposed freely to the air. All feather-beds and mattresses ought to be teazed out and made over again. Things of no value should be burnt, as newspapers and journals for example. Books should be carefully aired, and well shaken over some fuming disinfectant. In all towns there are now large disinfectant chambers, where wearing apparel and bedding can be disinfected for a small charge. In

villages, the wearing apparel might be hung around a small spare room or outhouse, and then fumed with sulphur, or with iodine, the fumes of which are excellent as a disinfectant.

Should the patient die, the corpse should be washed with a strong solution of carbolic acid, placed as quickly as may be in a coffin, disinfectants being placed beneath and over it; and the coffin lid screwed down without delay. The burial should be proceeded with at once.

Such are the measures to be carried out when fever has once entered a house. It is not sufficient merely to see the patient through the fever, in scarlatina, small-pox, and typhus: the most infectious period is that of early convalescence. Convalescents should be kept away from the healthy in convalescent rooms or wards; until the last scab has fallen off in small-pox, and until the last particle of skin has exfoliated and come away in scarlatina.

§ 226. The next point to be discussed is the question of the dissemination of disease by those who attend upon the sick, as the medical attendants and nurses. First as to the medical attendant. When attending fever cases, the ordinary conventional rules ought to be put in abeyance; and the medical man should see his patient without removing his macintosh, and after leaving the room should have it sponged with Sanitas. This would pretty effectually disinfect him. He should also wash himself well either with Wright's tar soap or the "L.G.B." solution; hands, face, and beard all should be disinfected. After this he might go on his round without practical fear of being a poison-carrier. It is well, when possible, to visit the fever patients last on the daily round. In rural practice, of course, this is not always practicable. Especially is it necessary and imperative upon the part of the medical man to take precautions when he has midwifery to attend. There is no evading the conclusion that the vagina readily takes up septic matter when brought in contact with it; and the scarlatinal poison readily sets up puerperal fever of a hopeless character when so conveyed to a parturient woman. The hands should be carefully washed, first in a solution of carbolic acid, and then in pure terebene. The carbolic acid solution should be used first; then the hands may be rinsed with simple water, and lastly

washed in the pure terebene or in pinol; by such means they will be free from dangerous properties, as well as odour.

As to the disinfecting of nurses, the question is a complicated one. In fever cases among the affluent there should always be two nurses, so that they could have regular and sufficient sleep in a large double-bedded room well ventilated. It is obvious that if the nurses' room is attended by the ordinary domestics there must be some considerable danger of infection. The nurses then ought to do the chambermaid's work of their own room, carrying their slops, well disinfected, into the same room as the slops from the sick-room are carried; and which should always and unintermittingly be well disinfected. Their changes of linen should be brought about in the same way; all soiled linen being immersed in an antiseptic solution as soon as taken off. After it is done with, this nurses' room ought to be fumed and scoured in the same way as the actual sick-room—as given above.

In the dwellings of the poor, however, it is almost impossible to take efficient precautions against the carriage of infection by the nurses. Where neighbourly kindness has to supply the place of a hired skilled nurse, some risk must be run by the nurse; and when a neighbour sits up all night with the sick patient, it is not only the self-denial and exertion undergone that claims our respect; but there is actual possibility of infection and danger to their own loved ones at home which is risked. Under such circumstances the use of disinfectants and the exposure to the air in passing from house to house are almost all that is feasible. While respecting neighbourly kindness in the humble, there is another form of neighbourliness which is to be sternly reprobated; and that is the reckless and thoughtless visits of the gossip to fever-stricken houses, "just to see how they are getting on." This is useless, and fraught with danger; and the medical attendant should set his face determinedly against all such practices.

§ 227. The only prospect of improving matters, as regards the management of fever among the poor, is the institution of fever hospitals in towns—in epidemics they may be of a temporary character—and the spread of the cottage-hospital system. The latter arrangement would meet famously the

necessities of sporadic cases of infectious disease, and would often prevent the spread of such disease. This is especially true of typhoid fever, which is largely spread by persons going from one place to another while the fever is latent in them; on arriving at their new residence the fever develops; they are nursed by well-meaning but ignorant persons; the dejecta are not disinfected, and, finding their way into the water-supply, a local outbreak of fever results. If the cottage-hospital plan were in general use, the patient would be nursed under circumstances much less favourable to the spread of the disease; and the nurse, knowing something at least of nursing, would be less careless about the disposal of the dejecta, and so would limit the disease.

It is by no means absolutely necessary for the practical adoption of the cottage-hospital system to have a handsome building; a good well-aired cottage standing alone, with an intelligent widow in it, would form quite a sufficient hospital for a village, except in special outbreaks of fever. Such cottage and nurse could easily be secured by any board of guardians; while the union medical officer would willingly give some attention to the training of the nurse. Such an arrangement, with the nurse under the doctor's orders—a matter of no slight importance—would often check troublesome outbreaks of typhoid fever, and nip them in the bud.

The importance of having some similar institution for the reception and detention of travellers from places notoriously affected with infectious disease, until their perfect healthiness is demonstrated, it is easy to see; but it would not be easy to carry such arrangements into practice with Anglo-Saxons. When, however, the liberty of the subject extends to carrying fever-poison to others, and so endangering their lives, or, at any rate, subjecting them to expense and suffering, that liberty seems certainly to call for some restrictions.

§ 228. *Private Hygiene.*—This important matter may most conveniently be divided into two sections, (1) that of the healthy individual; and (2) that of the invalid.

For a person in health the great question is how to preserve this condition of matters. In order to do this it is necessary to bear in mind the circumstances of each individual. If he be a

wealthy man, there will probably exist a tendency towards an unnecessary consumption of food, that is, in excess of his absolute needs: but this varies much with different individuals; if the person be in humble circumstances, the amount of food may be insufficient. The southern labourer, described by Charles Kingsley in *Yeast*, gets but bread and cheese, and an occasional bit of bacon, or a dab of dripping, for his unvaried dietary, upon which he has to labour as best he may: with him a more liberal dietary would certainly be beneficial. The full-fed servants of rich men's houses have too much of what most poor needle-women lack. Some intellectual excitement, some mental occupation, is as necessary for the workman engaged in monotonous pursuits, as pin-head-making or needle-grinding, in order to preserve him from insanity or outbreaks of debauch, by which his health may be imperilled, as is exercise in the open air for the clerk, confined for hours to close and heated rooms, or the merchant, who is little better off, except in the question of length of hours, or the barrister or the literary man, who live sedentary lives and breathe an atmosphere by no means too pure or too highly charged with oxygen.

At other times the question of clothes becomes an important matter. Especially is this the case when autumn wanes, and hot noontides are combined with cool mornings and cold evenings. In spring we usually continue our winter clothing till advanced spring compels us to lay it aside; and colds from the too ready adoption of summer costume, though far from uncommon, are less frequent than the various derangements of health in the autumn. In spring the form of ailment is usually an ordinary cold; in autumn a chill to the surface is apt to produce a catarrhal condition of the intestines which is set down to fruit. With some persons fruit seems to be regarded as the means of producing diarrhœa rather than as pleasant, wholesome, refreshing food; and is much too scrupulously avoided. It is wonderful, too, to see how carefully Eastern people, even in very hot countries, stick to their cummerbund, by which the loins and abdomen are kept warm and protected from sudden chills. Many Europeans develop in time a similar attachment to this article of attire. It is always well for

immigrants to conform to the customs of the places they migrate to; if they retain too conservatively their old habits, it is probable that illness will result, and after this experience they may become wiser; but then they may be killed or seriously injured in undergoing this species of instruction.

A great matter at present is the question of the bath. As regards the use of the bath, we have now reached a point not far removed from that of ancient Rome. Not so much time, however, is spent in the bath as yet; and the common form is that of the morning tub, now so universally in use. That cleanliness is a matter of the greatest importance we know well, and an efficient action of the skin is a great promoter of health. At the same time the free use of cold water tends to brace the vessels of the skin and educates them to contract readily on the impingement of cold, so that the risk of taking cold is diminished; nevertheless, there is something to be said on the other side. When the morning bath is resorted to in order to create a sense of energy and fitness for the day's work, which is wanting from imperfect hours of rest; it becomes no longer a useful agent, but contains an element of mischief. It then becomes a species of stimulant, which tends towards physiological bankruptcy; in that it enables the individual to reach his fund of reserve force, but does not itself furnish force, nor anything which can be converted into it. The general use of the bath cannot be too highly commended, but, like everything else, the bath is not an unalloyed good; it contains some potentialities for doing harm under certain circumstances. With many persons the cold bath does harm in this way:—It chills them too much, and the skin does not readily react and glow even when industriously and perseveringly rubbed with flesh-brushes or Turkish towels. For such persons it is desirable that the water have the chill taken off, and that the time spent in the bath be brief. With these precautions many persons may take baths with benefit who now cannot do so, and with whom baths are more injurious than beneficial.

For women the use of the hip-bath is desirable; and if that chills them too much, or is inconvenient, the bidet should never be neglected. Our English women are chaste doubtless; but in their chasteness they are apt to avoid all attention to

their reproductive organs; and are infinitely less careful about their personal hygiene in this respect than are their Continental sisters, especially the Frenchwoman. A great deal of feminine ill-health arises in or is fostered by neglect of ablutions round the hips and pelvis; and as the subject is rather a delicate one, it is not pressed by the bulk of medical advisers. A woman may be perfectly continent and chaste, and yet be scrupulously particular about her personal ablutions. Not only is the use of the bidet desirable every morning; but vaginal injections of cold water, alone or with a little Sanitas added, every day, are beneficial for those who have a tendency to a free flow of mucus from the vagina—and they are a large proportion of their sex—and in some cases these injections of cold water should be followed by the injection of a weak solution of sulphate of zinc, alum, or other astringent. Of course the ablutions must be sparing, and the water not cold during the catamenial flow; while the injections must be stopped during that period. By such means women would enjoy much comfort; and many of them better health.

Considering how women fasten their skirts from their hips and surround their pelvis with clothing, so as to keep it and its contents warm, indeed too warm; and the exposure to heat, as in cooks and laundresses; or the warmth of exertion in actresses, ballet-dancers, housemaids, and chambermaids; the action of the treadle in sewing-machines, especially the double-treadle form of machine; the close rooms in which girls and women have to live in commercial houses; and the warm rooms wealthy ladies prefer; all which tend to produce a relaxed condition of the vaginal mucous membrane: no wonder few women escape, at some time or other, a condition which renders the use of the bidet, and even the injection, indispensable to health and comfort.

Most modern houses of any pretensions contain a bath-room, and this is a most salutary arrangement. After fatigue, mental or bodily, especially in warm weather, the bath is a great comfort, as well as an excellent hygienic arrangement. They are now so fitted usually as to admit of warm or cold baths, or the shower-bath—a famous means of producing wakefulness in those who are too fond of lying in bed in the

mornings. Some also are so constructed as to give the needle-bath—a rather powerful agent, not to be used rashly; but very useful in asylums in the treatment of melancholia, or of simple dementia. The Turkish bath, now in much favour, is a luxury to most of those persons who frequent it; it is also an excellent means of treating a cold, if caught at the commencement. After exposure to chill, immersion in a warm bath, and then a sojourn in a bed comfortably warm, will usually take away all unpleasant consequences. Indeed, an hour or two in bed after a bath is usually very refreshing, and is not nearly sufficiently adopted in Great Britain.

So much for the ordinary use of the bath by healthy individuals. We may now proceed to the use of the bath, of baths, and bathing-places by invalids, or those who consider themselves to some extent such.

§ 229. The benefits to be derived from mineral waters, either warm or cold, poured out by certain springs, were recognized by old writers of medicine. How, and under what circumstances man first used such waters we can only speculate; probably for some persistent forms of skin disease. Empirically, and by long experience, was it found which baths did good in certain conditions. Now baths have developed from their primitive condition and become handsome and large towns; where a resident population thrives on the profits derived from visitors to these baths. As many of these visitors are there on the pretext of seeking the baths and drinking the waters, as are there for strictly necessary reasons. At most of these places there is pleasant society, amusements to engage the attention and relieve *ennui*, together with rules and regulations ostensibly to secure all the possible benefits from the baths and waters, and so impress the minds of the visitors; but which are at the same time directly conducive to health. In sending patients to baths and watering-places there are other advantages than those furnished by some peculiar form of mineral water. To the merchant who sticks too closely to business, and is engaged in crowded streets or thronged wharves the greater portion of the day, it is as health-giving to be out for hours in the open air; to meet pleasant company, to hear an outdoor concert, to rise early and to go to bed at ten o'clock, sleeping in a pure

bracing air; as it is to take draughts of sulphurous water until the liver is thoroughly unloaded, and then to drink chalybeate waters as a tonic. All this time, too, there should be a liberal but not too luxurious dietary; and the appetite should not be tempted too far by the nature of the viands. There are in such arrangements many things conducive to health beyond the mere mineral water. To ladies of fashion, after a long and exhausting season, which has turned day into night and produced the well-known depressing effects of exertion in heated rooms amidst an atmosphere fouled with myriads of gas-lights; the healthful quiet of a watering-place, its fresh air and sanatory breezes, together with long hours of rest at night, furnish an opportunity of regaining the lightsome sense of energy with which recently they have been but little acquainted; without there being any magical properties in the nauseous waters they so faithfully drink. The life led at wells and watering-places is itself so conducive to health, that we now find sanatoriums springing up in places where the waters are not vaunted as possessing any special properties; but where the claims of the institutions are founded on the other attractions the localities possess. Having admitted the advantages to be derived from the position and surroundings of most of our best-known watering-places and baths, it may be advantageous to review very briefly the different forms of waters, and the different disturbance of health to which each is best adapted.

§ 230. Firstly of water—as water. A large portion of the body is water; and a constant flow of water through it is necessary to existence, to say nothing of health. By means of water in simple solution, a great many constituents of the body find their way out of the system. A constant bathing of the tissues with fluid is perpetually going on, and by such means the waste is removed. In many persons the amount of water, in any and every form, consumed *per diem* is much too little for the efficient washing of the tissues. The bulk of water then which is insisted upon at the various baths is itself an agent of no mean therapeutic power; and if it be also charged with various alkalies, the removal of waste will be facilitated. When there has been a rather too liberal diet indulged in, and the patient suffers from suppressed gout in any of its protean forms,

such free consumption of water is very useful, especially when alkaline. Such waters are to be found at Aix-les-Bains, Vichy, Vals, Heilbrunnen, Neuenahr, Bladon (Aa.), and Congress Springs (Ca.); and are suited to dyspeptic affections, thickening of the joints, gout, and chronic affections of the respiratory organs. If it be desired also to act upon the bowels, and there is a sluggish liver, so called, or a loaded liver, with engorgement of the portal circulation; it is well to recommend the patient to visit some spa where the water is purgative as well as alkaline. Such water is furnished by the springs of Carlsbad, Marienbad, Tarasp, &c. Purgative waters charged with salt are to be found at Cheltenham, Leamington, St. Gervais; while fairly purely purgative waters are to be found at Püllna, Friedrichshall, the Hungarian Hunyadi János, Estill (Ky.), and Bedford (Pa.) Springs. Such waters are very useful in all cases where the digestive system has been systematically and regularly overworked.

In other cases, again, of broken health, as in the Indian cachexia, and the other debilitated conditions of the system produced by residence in tropical climates, and also in many cases where no foreign experience is in action, salt springs are very useful. In these springs chloride of sodium is combined with other constituents, maybe carbonate of lime and carbonic acid, as in the waters of Homburg, Kissingen, Wiesbaden, Harrogate, Baden-Baden, Cronthral, Congress, &c.; or with traces of iron, as is the case with several of the waters just mentioned. In some of these springs the proportion of salt is much greater than in others, and for many persons the milder waters of Baden Baden, Canstatt, Charleston (S. Ca.), are to be preferred to the highly-charged waters of Mannheim, Soden, Homburg, Saratoga (N.Y.), and Ballston (N.Y.). Then there are sulphur springs possessing their peculiar properties. They are said to act well upon lethargic skins, to be useful in rheumatism; being commonly purgative, they are beneficial in plethora and biliary congestion. Aix-les-Bains is the favourite resort for gouty patients, and during the months of June, July, and August there is no dearth of amusements of all kinds. The hotel accommodation is excellent, and the tariff is not excessive.

Aix-la-Chapelle is a mixed salt and sulphur spring, thought

to be specially good in constitutional syphilis in the debilitated; it is useful of course in many other maladies. Wielbach, Aix-les-Bains, Langenbrücken, Stachelberg, La Prese, Allevard, Enghien, the old sulphur-well at Harrogate, Gilsland, Moffat, and Strathpeffer are among the principal sulphur springs of Europe; while in the United States there are West Baden (Ia.), Paroquet (Ky.), Sharon (N.Y.), the milder and pleasant waters of Minnequa (Pa.), Jordan's White Sulphur (Pa.), Greenbrier's (West Va.), and others; and in Canada the powerful Sandwich Springs, near Ontario. These waters are all unpalatable, but are very serviceable in cases where the indulgence at the table has been rather too free. By means of Harrogate and Buxton, the wealthy, self-indulgent, high-living manufacturers of Yorkshire and Lancashire continue to keep themselves in moderately fair health; and in many cases even in redundant health.

Then there are chalybeate waters of great importance and freely scattered. These waters are either resorted to at once, or after a course of some of the waters previously mentioned. They are either themselves fairly pure, or mixed with other constituents, as salt, carbonate of soda, or sulphate of magnesia, or soda. If situated at some height above the sea, they are more efficacious. Thus Schwalbach is 900 feet above the sea, Spa 1000, Bagnères de Bigorres 1850, and St. Bernardine and St. Moritz over 5000 feet above the sea. Ferruginous waters are commonly found charged with other mineral constituents. Thus the waters of Giesshübel, Heilbrunnen, the Bailey Springs (Aa.), Estill (Ky.), &c., are also alkaline. Those of Marienbad, Franzenbad, Elster and Ocean Springs (Mi.) are alkaline-saline. Kissingen, Canstatt, Homburg, Harrogate, &c., are ferruginous and salt. Pyrmont, Bagnères de Bigorres, Tarasp, St. Moritz, Stribling Springs (Va.), &c., are also vastly saline; while Schwalbach, Spa, Tunbridge, Harrogate, and Marienbad are comparatively pure iron waters. Many of these waters are highly charged with carbonic acid, and so possess exhilarating qualities. One great matter, perhaps the greatest matter of all with mineral waters, is their dilution. The different substances are largely diluted with water, and thus are more readily assimilable than when given from the medicine bottle. Where

patients are poor, and cannot be sent to drink mineral waters, nor yet even purchase imported mineral waters, much may be done by directing them to drink large draughts of water with or after each dose of medicine. This, as has been remarked before, often makes all the difference betwixt the medicine doing little or no good and its being beneficial, especially in combinations of alkalies with iron. The bicarbonate of potassium with potassio-tartrate of iron in a bitter infusion, with or without a little sulphate of magnesium, will often produce as good effects as can be derived from some far-distant spring—if largely diluted. It is not the interest of those connected with such springs to admit this fact; and on the other hand, such home treatment does not include the new scenery, the fresh air, the pleasant life and gaiety of a fashionable spring; and in so much is actually inferior to a visit to a spa.

There are also waters impregnated with iodine, as in the waters found at Kreutznach, Wildegg, and Adelheids Quelle. They may be taken in large quantities, indeed must be so taken, in order to furnish much of the medicinal constituents to the system. Lithium has been found in the Murg-quelle, and at Elster. For its solvent action upon uric acid and urates, much has been expected from it in the treatment of gout. Large quantities of water must be drunk in order to take in any perceptible or medicinal amounts of lithium; but the cases thus to be benefited often need large quantities of water as much as the mineral constituent.

Waters are now exported in large quantities, and vary from the potent Hunyadi János water to the delightful table waters. Artificial waters, seltzer, soda, potash and lithia, are now largely manufactured, and are in almost universal use, to add to spirits, wine, beer, or to be drunk alone. As lemonade, water simply charged with gas, and acidulated, has an extensive sale. The chief drawback to these artificial waters is their price.

§ 231. So much for the various forms of water furnished by our best known baths and wells, and the indications for drinking them. Now we may review the more special use of them as baths, and for bathing purposes.

First, as to the effects of temperature. In a bath below the temperature of the body there is a decided loss of heat,

the surrounding water being a good conducting medium. Consequently even cold baths are rarely below 50° Fahr. If below this the immersion must be brief; and even then they can only be used by those who are fairly strong. The more the bather agitates the water the greater the loss of heat. After a cold bath the bather usually rubs the surface vigorously and produces a glow over the skin; this is caused by the dilatation of the cutaneous vessels and the rush of warm blood through them; the vigorous exercise of rubbing resulting in increased heat-production. The tepid bath is from 85° to 95°. Such baths are suited to delicate people, and such is the temperature of baths in which people reside for hours, as in Baden (Vienna), or in the water under the Blocksburg at Ofen (Buda). At Leuk men and women sit for hours in water, "with card-tables and drinks floated to them on trays." The warm bath is from 96° to 104°. Here the pulse and respiration are not much quickened, but the skin is induced to act readily. The hot bath runs from 104° to 110°, occasionally to 120°, which is very hot. Such baths form powerful stimulants, and excite the pulse and respiration considerably. They are obviously not adapted to weak persons. In hot baths the skin is thrown very feebly into action; and this transpiration through the skin, taken together with the large draughts of water swallowed, produces a flow of water through the tissues of the body, which exercises the most beneficial effects. It is often well to go to bed after such baths, so that the perspiration goes on without fatigue, often with sleep; by this means baths are made more effective. Baths and drinking the waters then commonly go together; occasionally it happens that the patient either cannot or will not tolerate one of them, and consequently must go without the benefits to be derived from the combination. In many conditions such hydropathy is very useful and health-giving, and is much to be commended. There is no doubt that hydropathy, rescued from quackery and under proper professional guidance and superintendence, will form one of the most universal remedies of the future; especially in cases where the system is laden with the deleterious products of waste.

Vapour baths, Turkish, Russian, or natural, are also excellent measures for exciting the action of the skin and inducing the

depurative effects of perspiration. In addition to their general application, waters and vapours can be applied locally to many parts with advantage. The shower bath directed to the head is a familiar illustration.

Cold baths are often too depressing, and hot baths too stimulating to be indulged in safely by a large proportion of the visitors at baths and bathing-places.

There are other baths than those of pure water, of any temperature, and those of mineral waters. Such are the sand baths of Blankenberg and Norderney. A hole is dug in the sand, and then the patient is placed in it, and the sand shovelled in around him. They are said to produce free action of the skin. Such proximity of damp sand must cause much heat-loss; and these sand baths were the favourite treatment of yellow fever by the buccaneers of the Spanish Main. In other places mud baths are in vogue. Peat or turf baths are common in many German spas. Such baths are powerful cutaneous stimulants, and in some cases produce much cutaneous irritation. Partial peat baths, or peat poultices, are also used by some. Peat water forms the bath at other times. Baths of pine balsam are in vogue in some places. They also excite the skin when inactive. They are fragrant from the resinous substances in the pine balsam. The dregs of the wine-tub have also been utilized to form a species of bath. These baths have the properties common to all baths. Finally there are electrical baths; doubtless useful at times, but too much surrounded by quackery.

§ 232. There are also health-resorts which have nothing whatever to do with wells or springs, but which attract, in consequence of their climate and position. Such are Brighton, Ramsgate, Torquay, Aberystwith, Westward Ho! and Cromer, Scarborough, Whitby, Silloth, and others. These different places on various coasts, east, south, and west, are good and beneficial to different cases. In some cases the warm soft air of Devonshire is as healthful as it is depressing to others; while these last are benefited by the bracing air of eastern and northern localities. It is a matter of no slight moment to many persons where they reside. Some, however, are never well at the seaside; others, again, never so well as

when there; while a third series find a sojourn by the seaside annually to exercise a most excellent influence over them for the rest of the year. In these different cases varied instructions must be given; and if one place distinctly disagrees with the patient, let him or her resort to some other locality. We cannot yet find an explanation of the why and the wherefore that some organisms feel well at Hastings, with which Brighton never agrees. It is useless to say that this is all imagination—though of course in some cases it is little else, because we cannot unravel and lay bare the subtle peculiarities of individuals which we denominate idiosyncrasies; we must bow before the facts until we can explain them. That such individuals should only be found in the affluent classes is intelligible enough; such organisms are incompatible with the hardships of labour for an existence, requiring residence, not according to sensations, but according to opportunities for making a livelihood. But since they do exist, it is the business of the physician to enable them to prolong their existence; and to make that existence as tolerable and agreeable to them as possible. It is chiefly with respect to the consumptive that health-resorts have been studied. Experience has taught us much in these matters. The first impression was to send the patient in winter to some warm climate, where the genial air and mild temperature would enable the patient to be out of doors for hours even in mid-winter; breathing an air at once pure and fresh, and yet not so cold as to induce attacks of inflammation in the diseased lungs. Madeira, from its position and its being on the route of Indiamen, was a favourite place for a long series of years, and was much resorted to; but now it has fallen from its high estate, apparently, however, from no demerits of its own. The shores of the Mediterranean are now the favourite winter resorts of the Anglo-Saxon, the Sclave, and other races, whose own winter temperatures are too severe. Egypt is also now a popular resort, as steam has made it more accessible to the world. Tangiers too has its advocates; as also has the Cape.

On the other hand, it has been found that in a large proportion of phthisical cases it is not some warm place in winter that is to be desired so much as a cool place in summer; where a bracing air maintains the general health in a desirable state.

Consequently these cases seek the heights of Switzerland and the Tyrol, where the summer air is chilled by the proximity of snow-clad mountains. In these elevated regions the consumptive finds comparative health during the warm weather; and descending on the approach of cold weather to some healthful region nearer the sea-level, again finds a suitable resting-place compatible with existence. By such alternations life is preserved. It is even asserted by some that there are altitudes where consumption is never found, as in the Upper Engadine; and that the phthisical can be snatched from the fate before them by resorting to such places as lie without the tubercular zones. But this is largely fancy, and it will not be wise to trust too much to this avoidance of consumptive zones. So far have we advanced, or at least moved from the old therapeutic position, that while a low-lying warm locality in winter was once alone thought safe for the consumptive, we now advise the phthisical to winter in comparatively high altitudes; and that, too, with apparent advantage. In India also the hills are no longer forbidden to the consumptive, who can find there a comparatively comfortable existence, as well as other invalids do.

With regard to the proper residence for the consumptive, we must ascertain first, the sort of climate and the degree of temperature which formerly suited the patient's constitution, or, in other words, agreed best with him when he was in health; and secondly, the state of the patient's bronchial mucous membrane at the time when his removal to another climate comes under consideration. When the bronchial mucous membrane is irritable the invalid cannot bear the effects of a dry and stimulating atmosphere, however warm the locality may be. He requires a soft atmosphere, and its temperature and the precise degree of necessary humidity must be determined by reference to his constitutional peculiarities. If he formerly enjoyed better health in summer than in winter, and felt greatest vigour in warm weather, and in an atmosphere devoid of markedly stimulating or relaxing qualities, the probability is that the climate of Syria, Persia, Rhodes, Egypt, and other parts of Northern Africa, would exercise an influence on his system, the good effects of which can be hardly over-

estimated. If, though usually better in summer than in winter, he was formerly oppressed by excessively dry heat, but enjoyed a warm, humid atmosphere, such as that of South Devon or Cornwall, the probability is that the climate of Torquay, Dawlish, Penzance, or Jersey, of Pau, Rome, the Azores, Teneriffe, Madeira, Santa Cruz, the Mauritius, or Ceylon, according to the degree of temperature required, would be found to suit his general health, and assist in subduing the irritability of the air-passages. If he is constitutionally disposed to general languor, and has always felt as much depressed and enervated by heat as pinched and prostrated by cold, then, notwithstanding the irritability of his bronchial mucous membrane, a medium climate must be sought—a climate such as is to be found in Queenstown, and other parts of the coast of Ireland, in the western coast of Scotland, at Buxton, Cheltenham, St. Leonard's, Ventnor, and Bournemouth; or, if a somewhat higher range of temperature is necessary, in New Zealand, or the Cape of Good Hope. A large class of consumptive patients exist in whom there is little or no irritability of the mucous membrane. In these a drier and more bracing air will generally prove of the greatest benefit; but nevertheless, as in the former cases, the selection of a locality in each particular instance must be regulated by the constitutional peculiarities of the invalid. If his circulation is languid, and he has usually felt more vigorous in summer than in winter, the invalid must repair to a warm locality, and in such a case the climate of Mentone, Hyères, Cannes, Malta, Nubia, Algeria, Upper Egypt, the northern districts of Syria and New South Wales are likely to prove extremely beneficial. In some such cases the air of the Himalayas, the more elevated parts of the Andes, and other hill districts, has been found remarkably serviceable. If the patient has an active circulation, and has usually enjoyed better health in winter than in summer, feeling braced and invigorated by cold, he will probably derive benefit from a residence at Brighton, Margate, Aldborough, Cromer, Harrogate, or Malvern; or if a cooler and still keener air is required, from the climate of Montreal, or other places in Canada, or of certain dry localities in Russia, or other northern countries. Some of the most remarkable recoveries from consumption which have come

within our cognizance have occurred under the bracing influence of a northern clime.

It is now customary to send consumptive patients to high altitudes in winter. It is asserted that the dry cold of a high Swiss valley, together with fairly constant sunlight, is much more salutary for such patients than the damp British climate; and this may not be contradicted. But getting away from unhealthy damp surroundings—the negative factor is often quite, if not more important than the positive factor, the high Swiss valley. The cases which do so well at Davos are just those which would do well at health-resorts at home. At least it may fairly be put thus:—Is the superiority of the foreign health-resorts such as to meet the cost so incurred? In many cases of phthisis bracing health-resorts at home would give very excellent results.

The remarks about the consumptive patient will apply to a large class of invalids, to whom a residence suited to their individual necessities is quite as important as it is to the phthisical. In all cases indeed the answer to the question of the propriety of going abroad must be answered carefully and conscientiously. It will not do in so grave a matter to give an off-hand answer, when the question involves residence amidst strangers in a foreign land, who speak an unfamiliar tongue; away from friends and relatives whose kindly sympathy is so dear to the invalid; with the prospect perhaps of a lingering death, where no kindly hand will cool the fevered brow, no well-known voice solace weary hours, no familiar presence cheer the chamber of the sick person. To send an invalid into exile without a good and valid reason is very improper. Even when several members of the family can accompany the invalid, it is a serious matter to order what may be productive of much inconvenience without good and valid reasons. It is sad to reflect upon the number of cases where all the good accruing from a foreign residence is allowed to gradually slip away, because the patient is not put upon appropriate medicinal and hygienic treatment after returning home. Only too often the physicians of health-resorts do not sufficiently insist upon this.

§ 233. *India.*—The question of change of air in India is one

of such importance that it can scarcely be exaggerated. Sir Joseph Fayrer in this connection says:—

"The subject of change of air and climate is a most important one in India. I really believe that it is more so there than at home; and if the Calcutta medical men had it not to fall back upon, they would find great difficulty in restoring a number of their patients to health. The most important means of obtaining change of air are the following: (1) the Hills, (2) the Sea, and (3) Europe. These are all extreme methods, and there are many slighter, but very effective changes—none so trivial as to be unimportant. For instance, change to another house, or even to another room in the same house; to another station, even if there be no very obvious difference in the climate; a few days or even hours in a boat on a river, if the patient be near one; and in Calcutta a run down the Hoogly in a small steamer to the Sandheads, where a day or two may be spent actually in real sea air; each and all of these are valuable remedies, and contribute largely towards enabling our countrymen and women to fulfil the period of their exile in the East, and to return to Europe, damaged it may be in constitution, and compromised in their capacity for sanguification; but still free from what is ordinarily termed structural disease. Of course the change of climate adapted to one is not always suitable to another; the visit to Simla, Missouri, Darjeeling, that would restore one man to vigour and health, might prove fatal to another; even the health-giving sea-air, if resorted to only in the Indian seas, might prove a delusion in those cases where the more radical change to Europe is indicated, as I have often found to be the case. The difficulties of getting away, the probable loss of appointment or business, the want of funds, the anxieties and care of an establishment at home and in India; the temptation to complete the one or two more years which will conclude the term when a pension becomes due, and India may be abandoned for ever—these and other motives have led many a one to trust to the lesser change of a voyage to Burmah or Singapore when the more radical one of a visit to Europe alone could have restored health, or, indeed, saved life.

"These are sometimes difficult problems for the medical man

to solve, and at times it is necessary to be very firm in urging the necessity for a step that is so full of importance to the patient and his family. The question will naturally arise as to what are the cases where this change of air is desirable, and what variety of change is suited to particular cases? I believe that such change is needed for Europeans in India, after all attacks of disease which have amounted to more than mere passing derangements of the bowels or stomach; or perhaps slight attacks of fever the result of heat and exposure, or other corresponding trivial ailments, from which the young and otherwise healthy persons recover there as well as here: but in all cases where the disease or ailment has lasted longer than this, change is generally needed to restore the patient to his usual health and pristine vigour. I do not in the least mean to assert that he will necessarily remain an invalid in all cases without it; but that it is very desirable—that it is good economy in time and money—for the mercantile man, and also for the public servant, who is thus sooner fitted to resume his duties effectually, and to perform them with greater benefit to the State.

"The complete change to Europe is the most important, and it is often very necessary. Formerly under the old Honourable Company's *régime* a period of three years' furlough was accorded to officers who had served many years in India; and it was a wise rule. It has been contracted of late years, and the period reduced to two years, and even less; but I have frequently observed that it is the *third* year at home that completes the re-establishment of health in the cases of many who have been long exposed to the influence of the Indian climate. Eighteen, fifteen, and twelve months are the periods of leave now generally granted on medical certificate; but these are too often insufficient, and have to be extended. As a general rule, one might say that a visit to Europe for a year at least is desirable after six or seven years' residence in India, especially if that time has been spent in the plains; and this even when there may have been no illness, only that deterioration which takes place more or less in Europeans after a protracted residence in hot and malarious climates. But after attacks, and still more if they have been severe, of the so-called

tropical diseases, change to Europe is often the only means of restoring health; especially in those who have had more than one attack, and have also been long in India. Such cases as chronic dysentery; enlargement, malarious or otherwise, of the liver and spleen; abscess of the liver, and that dubious state in which no one can feel sure that an abscess has or has not formed; malarious cachexia, the result of frequent recurrence of fever, or of exposure to malarious influences, that have not caused fever, but anæmia, neuralgia, local disturbances of venous or arterial systems, with the numerous evils that result from that condition, according to the degree to which they exist; albuminuria, imperfect function or disease of the organs concerned in the due and proper elaboration of the blood, as evidenced by lithæmia and all its attendant troubles; the broken health which often remains after cholera and attacks of continued fever, insolatio, and above all that which is so commonly the consequence of overwork, mental rather than bodily, when the mind more than the body needs rest—such are the cases, but by no means all, that require the radical change to Europe.

"Next to this comes a sea-voyage. This may be to China, to Singapore, to Ceylon, to the Andaman Islands, seldom now, as used to be the case, to the Cape of Good Hope, or even the brief run to Madras, or some place on the coast; a few days on board a pilot brig or light vessel at the Sandheads, or a run down the river in a steam-tug just to meet the sea-air and return. Such trips are often of the greatest benefit, but unfortunately they are frequently far from sufficient, and are only the preludes to the change to Europe. Still every one in Calcutta knows how great is the benefit these trips confer, and how often, if taken in time, they serve to stave off or prevent the necessity of some more radical change. After attacks of fever, hepatic congestion, bowel complaints, nervous irritability, the result of heat, overwork, and imperfect action of the liver, an absence of this kind, say for a fortnight, in a steamer crossing the Bay of Bengal, will often restore health; while in lesser cases a run down to the Sandheads, or a trip to Madras and back, will suffice. The fact is that by medical treatment, with all it implies, a patient may be got over the worst part of his

trouble, and be restored to a certain condition of convalescence, —but can be got no further. Hitherto he has been getting on in a direct line, but ultimately he gets into a species of circle and makes no progress, and then it is that the sea-trip does so much good, and enables the invalid to return to his work. For instance, take the case of a young man who has been a few years in Calcutta, and who has already begun to feel the climate: he has an attack of fever with a certain amount of hepatic trouble, or perhaps even dysenteric complication. The early treatment is perfectly successful, and the symptoms rapidly disappear; but he does not get on, and remains weak and depressed, and unfit for work. Tonics, food, &c., all do no good. Send him for a week to sea, and he comes back strong and healthy, with colour in his cheeks and vigour in his frame.

"Now we come to the Hills. They are valuable too, and often do much good, but they cannot take the place of the change to Europe, or even the ordinary sea-trip. For many cases, Darjeeling, Missouri, Simla, Murree, are all too cold and too elevated, and they do more harm than good. There is in such cases no power of resisting the influence of cold and the rarefaction of the air; and diarrhœa of a most intractable character results. These hill stations are useful rather as places of refuge from the great heat, for the mental rather than the physical (though that too very often) effects of change; and for the bracing effects of cold air in those who are strong with unsapped constitutions. Those who have suffered from overwork, mental strain, malarious cachexia in the slighter forms, or have a nervous system rendered irritable by responsibility and anxiety, or exposure to heat, may and often do benefit by it; but the hill stations of the Himalayas are seldom of use to those who have suffered from hepatic disease, dysenteric affections, or general malarious cachexia. As a general rule these cases should not be sent there, but to sea, or home to Europe. It is not the same with the hill stations of the south, Ootamacund and Conoor; much further south they have a different and less extreme climate, and are frequently of the greatest benefit; as I have often recognized in the case of patients of my own sent from Calcutta.

"As to minor changes, such rules as apply at home obtain in India, only I think they seem to tell more strikingly there. In short, change of air and climate constitute the most powerful curative agents, and often preventive measures, we have to fall back upon in India, and it is impossible to say too much in their behalf. This brief note is insufficient to do even the pretence of justice to the subject."

These remarks are most valuable and suggestive: pointing out, as they do forcibly, the limited amount of benefit to be derived in grave cases from a resort to the hill sanatoriums; which appear to be overrated as to their potency by those who are not familiar with the subject in its entirety.

§ 234. The subject of change of air and climate comes home to most of those who are either naturally delicate, or who begin to feel the tax of prolonged physical toil and exertion, or mental tension, in tropical or sub-tropical climates. In such cases the sea-voyage, when practicable, especially when it leads to new lands, new topics of thought, novel scenery and associations, is very desirable; as when the American takes a trip to Europe; when the resident of the Cape, or the Australian, takes a similar trip; or when the European visits their lands. In each and all cases such change is not uncommonly of inestimable benefit, and almost always of some decided good. When such voyage is not feasible, then a sojourn among the Blue Mountains of Virginia; or now to the Rocky Mountains, and the prairies that lie at their feet; or even to the Californian sierras, is beneficial to the denizen of the United States. The northern spurs of the Rocky Mountains in English territory, with the pleasant land known as "the fertile belt," which lie around them, form a magnificent site for sanatoriums; as well as health-giving resorts for the naturalist, the artist, or the sportsman. In South America the slopes of the Andes are available for those who need coolness and quiet; and the lofty table-lands of Quito offer sites for sanatoriums; though perhaps liable to the objections which Sir Joseph Fayrer makes to the hill stations of India. Simla is 8,000 feet above the sea; Quito is 9,000 feet, while the table-land of Mexico is over 6,000 feet above the sea-level. Such altitudes, while doubtless securing coolness, must necessarily possess a rarefied air, and have other drawbacks.

It is not only the intervals of convalescence in the invalid which give importance to these matters; there is also the question of prevention, of the right and wholesome use of holidays. The tours through Switzerland to the Ardennes, the Tyrol, or the Hartz Mountains, now so common with Europeans, are excellent health-giving measures, which can scarcely be too highly commended; but some caution is necessary that they are not made fatiguing, especially to the weaker and less enduring members of the party, under which circumstances they often do much more harm than good. Thanks to the enterprise of the Great Eastern Railway, ten days or a fortnight may be spent in Antwerp, Brussels, Namur, Dinant, Spa, Liège and the surrounding district, for an expenditure which brings it within the range of the most moderate purse. The Holiday Handbooks published under the auspices of Mr. Percy Lindley, and sold at the modest price of one penny each, will be found most useful to the intended tourist. For the residents in low-lying plains an annual sojourn to some elevated inland resort, or to the sea-side, is very desirable; while for those who live in elevated places a similar annual sojourn by the sea in some mild neighbourhood is equally beneficial. It is not, however, always the mere change of air that does all the good; there are other factors often, as the change of habits, of scenery, and of new surroundings generally, which are of no slight value.

CHAPTER XXIII

FOOD IN HEALTH AND IN ILL-HEALTH

§ 235. Scarcely, if at all, less important than medicinal agents is the matter of food. The subject is one which has attracted much attention at all times; and varied views have been expressed about it, from the whimsical distinctions as to the action and effect of different meats given in the *Anatomy of Melancholy*, to the clearer and more exact statements of Physiological Handbooks.

Foods have been divided into two classes: (1) nutritious or plastic food; and (2) respiratory food; not forming the mineral elements of food into a distinct class. This division had something to recommend it, but it is far too absolute. In the first place, plastic forms of food, to a certain extent, are respiratory food; and hydro-carbons are also requisite to the formation and building up of healthy normal tissues. Muscles, the very type of plastic food, contain a certain amount of glycogen in health, and in so far contain a hydro-carbonaceous, or respiratory food. In the oxidation of azotized matter on its road from peptones to urea, a certain amount of heat, or force is produced; independently of any hydro-carbon contained in the azotized food. On the other hand, tissues for their building and repair require a certain richness of hydro-carbonaceous matter; and if the food be too poor in this respect, wasting follows, with a strong tendency to the formation of tuberculous growths. Hence we strive to arrest the tubercular habit by giving the patient a plentiful supply of hydro-carbons in the concentrated form of oil or fat; and in order to secure their better assimilation, give

with them tonics and stomachics. Artificially digested foods are in common use and are of much value.

Retaining, then, this division in a modified form—namely, as (1) nitrogenized, and (2) non-nitrogenized foods, we proceed to consider the matter more in detail.

Nitrogenzied foods are those which in digestion are formed into peptones, and from which the tissues are built and repaired. The amount that a growing boy will eat of this material with impunity, indeed with advantage, is many times greater than what is required by an adult or aged person. In growth, tissues have to be built as well as repaired, and in health the digestive powers are fully equal to the task of assimilating the required material.

If a sufficiency of suitable food be attainable, and the assimilative powers are healthy, a fully-grown organism, structurally sound, is the result. But a much smaller quantity of nitrogenized food is alone absolutely required when the full growth is attained. In the face of this fact, the consumption of meat is widespread, and largely indulged in. There is a general impression that a diet consisting largely of animal food endows the system with a sense of energy and capacity. The gillie who lives ordinarily on a diet almost exclusively vegetable, quickly increases in power of endurance, and in capacity to manifest energy, in the shooting season, when his dietary is more liberal, and contains a good proportion of animal food. On a consciousness of the capacity to increase a man's power of labour by liberal supplies of food, of which a large proportion is derived from the animal world, the farmer engages men to live in his house and eat at his table; while their wives and children eat at their own home. The farmer knows well enough that, if he arranges so that the bread-winner gets his meals at home, he will share what he can procure with his offspring; and in doing so will diminish his own capacity to labour. The farmer gives his horses an extra quantity of corn when the duties to be performed are heavy; he knows that if he does not do so his horses will fall off in condition, and have to be fed up again; so, instead of taking from their stored-up force, he meets the increased wear and tear by a more liberal dietary. Not only does a liberal supply of animal food give an increment of

energy, but it also endows the organism with an additional amount of vigour. The meat-fed man is livelier, and his nervous energy greater, than the vegetarian. A bear which was fed upon meat became unmanageable; but a dietary which furnished no excess of nitrogen kept him comparatively quiet and submissive. The energy of meat-eating races and of carnivora contrasts with the quiet and more subdued ways of vegetarians and herbivora. It is then this sense of vigour which a dietary of animal food gives, that makes mankind crave after it; and induces humanity to consume an amount of azotized material far beyond the absolute requirements of their tissues. A highly nitrogenized diet is conducive to mental vigour: about that there can be no question. It is certain that three men, one of whom has had a full meal of meat and bread, the second cheese or salt fish, and the third potatoes, regard a difficulty which presents itself from entirely different points of view. The effect of the different articles of food on the brain and nervous system is different, according to certain constituents peculiar to each of the forms of food. And it is equally certain that the power of thought in an individual is very different according as to whether he is well and liberally fed, or is in a state of partial starvation. This is a matter, however, which does not admit of demonstration; and yet there is a large amount of evidence pointing to it, and indicating that there are relations existing between the different forms of food and manifestations of nervous energy.

We will now proceed to a part of this subject about which the proof is more certain, and the matter more demonstrable. Azotized foods furnish the material for our tissues, for whose renewal they are required. But this is much less than is supposed; and tissue-repair requires but a comparatively small portion of our plastic food. The rest of the peptones, which are produced in each act of digestion, are split up in the liver into glycogen and nitrogenized waste. All, or almost all, of this nitrogenized waste is superfluous; and the requisite amount of glycogen for the daily combustion within the system could be as well furnished by farinaceous or saccharine material as by azotized food. The amount of urea passed daily does not so much represent the waste of tissue, as the manufacture of

glycogen from albuminous matter in the liver. Even in fever much of the urea passed, frequently in large quantities, is derived from the albuminous and other nitrogenized material furnished to the system as food, in the shape of milk, beef-tea, eggs, &c. No doubt the tissue-waste, under a high temperature, is very considerable, but it must not be supposed that all the urea is furnished by tissue-waste. Much of the attention to the estimation of the urea excreted in pyretic conditions is thrown away really, and rendered comparatively valueless, because the estimates are not accompanied by accounts of the exact amount of the patient's daily ingesta. The origin of the urea is overlooked in the estimates, and the conclusions are radically invalidated by such omission. It may seem to some readers that this matter is unduly insisted upon throughout this work, but its importance is a sufficient vindication for the repeated references to it.

These products of nitrogenized ingesta are matters of much moment in the management of conditions of lithiasis. In renal inadequacy the first step, of course, is to diminish the amount of nitrogen consumed. The effects of quantities of azotized matter in the blood upon the nervous system have just been mentioned; and certain it is that the nitrogenized materials may be regarded as manifestors of force, *i. e.* the man whose blood is highly charged with nitrogen can evolve nerve-energy more rapidly and freely than can the vegetarian—the brain-power of each being equal—and probably can maintain that evolution for a longer time; but, nevertheless, the actual force is furnished by the combustion of hydro-carbons.

§ 236. In the hydro-carbons we consume as food we find the chief supplies of our force-producing material. All manifestations of force, muscular, nervous, and glandular, are produced by oxidation within the system. Each muscle has its little store of glycogen as muscle-sugar; and when functionally active, it is that glycogen which is consumed and oxidized, not the structure of the muscle itself. It was supposed by Liebig, and by other more recent writers, that the muscle itself was worn out in functional activity, but the experiments of Parkes and others have shown that sustained muscular activity is not so much accompanied by an increased amount of urea, as by an increased

production of carbonic acid. The muscle, in this respect, is not unlike the wick of a candle, it burns the supply of hydro-carbon; and as long as this is furnished in good quantity, it is but slightly consumed itself; when, however, the supply of fuel fails, the wick itself is consumed, as in starvation. As long as the amount of urea excreted daily is regarded as the measure of tissue-waste only, so long shall we have erroneous conceptions as to the amount of nitrogenized matter required to meet—what are supposed to be—normal daily wear and tear.

In hydro-carbons we find the great sources of our supply of force-producing material, as said before. There is a store of glycogen in each muscle, and a granary in the liver; while in our adipose tissues we carry, in a permanent condition, much fuel in a concentrated form. When the supplies of food are beyond the immediate requirements of the individual, there is an accumulation of stored-up material, giving an increase in body-weight. Not only is there an increase of fat, but each muscle is plumper and fuller; as is seen in the horse when in good condition, or made up for market. There is, in fact, a reserve of force-producing material stored up for the needs of the system, and a man in good full condition will outlive the spare man if exposed to complete, or partial starvation. This, however, must be understood: a fat man will not necessarily weather a fever better than a lean man, the clinical facts are rather the other way; nor yet will a stout man necessarily endure hunger better than a spare one; but the same organism possesses more endurance when in good condition than it does when previously reduced. The excess of nutrition is stored up, and evidence of this is given by increase of body-weight; when the demands upon the system are excessive, then the body-weight falls. The ordinary reserve store of man is equal to about eight or nine days' consumption, as found by the records of shipwrecks. If the surrounding temperature is low, the store is soon exhausted, because the body-temperature has to be maintained; if the exposure is in tropical regions, a longer period of abstinence is compatible with existence, because there, little is required to maintain the body-temperature, and so the reserve-store lasts longer. Much too depends upon the amount of muscular exertion to be performed; if great, the reserve stores will be all

the sooner exhausted; if little, as in a boat, or still more, a raft, and most when in bed, the stored-up force-producing material will be still longer ere it is consumed. When cold, we put our muscles in action; and in doing so produce more heat, and so become warmer. There is a greater combustion of muscle-sugar so induced, and thereby more heat is produced. So when muscular exertion is required from a famishing man, he is so much the sooner burnt up.

In sickness in bed the reserve stores are not much drawn upon; and if small quantities of nutriment are furnished, and the needs of the system are reduced to a minimum, a person will last several weeks on a very small quantity of food, and yet ultimately recover. Seegen gives such a case. The observations began after the patient (who suffered from a gastric affection) had been taking very little food for several weeks; and for nearly fourteen days had been living on thirty-five grammes of fresh milk daily. A gramme being approximately fifteen grains, this gives about 515 grains of milk *per diem*. In addition to this, she only took so much water; which, of course, furnishes no force, as it is not oxidized. The thirty-five grammes of milk contained, according to the determination of Becqueral and Vernois, 1·9 grammes of albumin, corresponding to 0·29 gramme of nitrogen taken daily, or 3·4 grammes in twelve days. The urea excreted during the same period amounted to 106·9 grammes, containing 49·8 grammes of nitrogen; and the excess of nitrogen excreted over that consumed, and which necessarily must have come from the tissues of the body, was 46·4 grammes. From the thirteenth day of observation onwards, to the twenty-fourth, a much larger quantity of food was taken; the milk during this time being 2,275 grammes daily, besides an egg, and a little arrowroot. The nitrogen taken into the body during this period in the milk alone was 1·76 grammes daily, while in the first twelve days it was only 0·2 gramme. The excess of nitrogen taken in the food during the second period over that in the first was, therefore, not excreted, but stored up in the body. This case shows well how insufficient supplies of food are eked out by tissue consumption, of which the urea forms the cinders; and then, again, how tissue-nutrition takes up nitrogen from the

food for the purposes of repair. It illustrates strikingly the requirements of convalescence; and shows how liberal supplies of food are required, the appetite and power of assimilation being remarkable at this time. The patient whose reserve-stores are small to commence with, is ill-prepared for any long or severe demand upon the system; and succumbs to demands which could be met with safety from fuller and more abundant reserve-stores.

From the hydro-carbon elements of our food, then, we get the bulk of that material required for the maintenance of body-heat and the manifestations of force. Some glycogen is furnished by the splitting up of peptones; and fuel is also furnished in starvation by the combustion of the tissues, of which the amount of unoxidizable waste is the measure.

It is desirable that definite and distinct impressions on this matter should exist, and that the importance of starch should be recognized. Those popular books and advertisements which measure the amount of nutriment contained in any substance by the proportion of nitrogen present would be very mirth-provoking, if they did not create erroneous impressions on an important subject.

For most persons a much larger proportion of farinaceous food in their dietary is desirable; and puddings of various forms may advantageously again make their appearance on other than nursery tables. The tendency of the present day is too much in favour of a lunch of cold meat, accompanied by a draught of wine, beer, or stout. No doubt in such a luncheon there are combined nitrogenized and hydro-carbonaceous elements, together with a stimulant; and where the alcohol in the beer does not induce somnolence, such a luncheon perhaps gives the necessary food in that form which best permits of an arduous afternoon's work being encountered. But it may be much wiser ultimately for younger men and growing boys to have a luncheon of a less stimulant character. The best luncheon a growing young man can have is a dish of roast potatoes well buttered and peppered, and a draught of milk. Or the same vegetable, with a little bacon or fish, may be made into a Cornish pasty, which if wrapped up in flannel will keep hot for several hours. The first form is within the reach of all

who follow sedentary or town lives; while the latter is suitable for those who must go a-field to labour, or those who must take their noontide meal with them. Such an arrangement furnishes the species of food required for the production of force, in a readily assimilable and non-stimulant form; and in doing so constitutes a most suitable dietary for a midday meal. Such a lunch ought to be combined with a liberal breakfast and a substantial dinner in the evening. The matter of breakfast is very important After a good substantial breakfast, long hours of labour can be undergone without a sense of fatigue or exhaustion; for hours can arduous work be maintained after a breakfast of bacon, or ham, with a good proportion of fat upon it; not only physical labour but psychical toil can be well undergone, and a long day's writing, preceded by such a breakfast, is sustained without any of that feeling of the thoughts no longer framing themselves readily into concrete sentences, or that the words will no longer readily drop from the point of the pen, which come on after a few hours when only a light breakfast has been taken. Those who have made observations on the matter, note how wide is the difference in endurance after such a breakfast as that described, and one of fish. Fish is rich in phosphorus, and "ohne Phosphor kein Gedanke" may have some elements of truth about it; but after a breakfast of fish, comparatively few hours of work produce the feeling of being exhausted; while a breakfast consisting largely of fat will give unwearied energy for twice as long. Phosphorus and nitrogen are very well in their way, and enable the brain to work up to a higher pressure; but the hydrocarbons are the fuel after all, both in the human organism and in the locomotive; and a certain proportion of each should exist in the dietary of all.

Perhaps a larger proportion of force-manifestors are desirable where the labour is chiefly cerebral, than where the toil of the nervous system is confined to keeping the muscles in action. Whilst on the one hand it may be freely conceded to the advocates of vegetarianism that a well-selected vegetable diet is capable of producing the highest physical development of which they are capable, it may on the other hand be affirmed with equal certainty that the substitution of a moderate pro-

portion of animal flesh is in no way injurious, whilst, so far as our evidence at present extends, this seems rather to favour the highest mental development. Barristers, literary men, actors, and others similarly engaged may find that an indulgent dietary enables them better to get through their intellectual toil; but if this is the case, it also throws some light upon the tendency in such persons to premature decay, or demise in the midst of apparently perfect and unimpaired health. It is the old story over again, "in order to live long it is necessary to live slowly;" or that moderation alone is conducive to the prolongation of enjoyment. A diet may be stimulating even without alcohol, though usually they go together; but such a dietary is hostile to length of days, while a non-stimulating dietary is conducive to prolonged existence. The individual must choose for himself in the matter; but where a large amount of intellectual toil has to be and must be undergone, then the power of choice is limited. In thus speaking of a stimulant dietary with alcohol, it must not be supposed that work can only be done under the influence of stimulants—far from it. The best and largest proportion of work is done on such a breakfast as has been just described; but then after the day's work is over, and the work done, a dinner of animal food, or largely so, with some alcohol, will secure the greatest fitness for the next day's toil. By such an arrangement it is found that the maximum of work can be done with the minimum of wear and tear. The alcohol under such circumstances should only be taken at meals, unless it be a small quantity at bed-time; and scarcely ever before dinner, especially if the labour has to be continued through the afternoon. Where, on the other hand, the labour to be undergone is chiefly muscular, a diet largely hydro-carbonaceous, and to a less extent of azotized material, is desirable, unless the labour be very severe; and then it has been found that a free supply of animal food is beneficial, as has been seen in the comparative capacities of English navvies on their wonted diet, in the construction of foreign railroads.

§ 237. Food, however, has other relations which are far from unimportant. In the excess, or diminution of certain constituents of our food do we find the explanation of many

of our constitutional conditions. For instance, in an excess of nitrogenized food we find the causation of much of the lithiasis, or gout, whether regular, irregular, or suppressed, with which we are brought into contact. In an excess of hydrocarbonaceous food does obesity take its origin; and abstinence is an effectual treatment for such a condition. In a deficiency of oleaginous matters is found to lie the tendency to those ailments which are regarded as scrofulous, or as tubercular. In either tendency it is ever of the greatest importance to flood the system with oleaginous matter, so far as it is possible to procure its assimilation. If one form of fat or oil is unpalatable or indigestible, it becomes necessary to substitute another; until some one is found which can be digested. Neither is it desirable that one form be adhered to until satiety is induced; changes must be made, and fresh olive oil may sometimes be substituted for cod-liver oil; especially in those seasons when vegetables are procurable in plenteous supplies and in good condition, and with which large quantities of oil may readily be taken. At other times cream with fruits, cooked or uncooked, may be taken in large quantities; with stewed fruit or strawberries it is well borne, and as Devonshire cream is delicious with preserved ginger; while cream and maraschino form a nutritive drink for the affluent consumptive. It is not always the same thing, however, to consume food and to assimilate it; and in many cases a liberal supply of oleaginous food, however necessary for the system generally, produces biliary disturbance. In these cases—and they are numerous—it is well to maintain a gentle action on the bowels, and every three or four days to induce purgation, especially by alkaline saline purgatives; by such a plan, sweeping away the superfluous bile, in these persons the assimilation of oleaginous matter can be much furthered. At the same time, open-air exercise in some bracing locality is very desirable. Not only must the *primæ viæ* be swept at intervals, but the removal of waste products, by liberal supplies of oxygen, is to be encouraged, such removal of waste being essential to perfect tissue-repair. As soon as oleaginous matter is supplied to the tissues, those changes known as tubercular growths give way to the formation of healthy tissues.

In obesity, on the other hand, it is necessary to avoid those forms of food which readily develop adipose tissues. The favourite plan, in vogue at present, consists of cutting off all hydro-carbonaceous food, and substituting for it a practically unlimited nitrogenized dietary. This is effectual in reducing the amount of fat; for the glycogen so furnished is insufficient for the needs of the system, and, consequently, the reserve stores of fat are drawn upon, and diminution in weight and bulk results. This plan is unphysiological, and is so far unwise that it takes no account of the amount of nitrogenized waste produced by it; and grave renal mischief often results therefrom. It is much more prudent to adopt a line of practice which secures the same results without the risks so run; and the best plan is to fill the stomach with material, which, while it satisfies the cravings of hunger, furnishes but little aliment. Vegetables, especially such as have much parenchyma, as lettuces, cabbages, greens, and spinach, are suitable. The next best material of diet is the use of cereals and fruits, taken in limited quantities. The cases of Lewis Cornaro; of Wood, the miller of Billericay; of a Whitehaven man related by Wadd; of a baker of Pye-corner (Wadd), are striking. Cornaro took daily but twelve ounces of food, chiefly vegetable matter, and fourteen ounces of light wine, for fifty-eight years. Wood for eighteen years lived on sixteen ounces of flour daily, in the form of a pudding made of sea-biscuit; by which plan he reduced himself some ten or eleven stones, and was "metamorphosed from a monster to a person of moderate size; from the condition of an unhealthy decrepit old man to perfect health and the vigour and activity of youth." The Whitehaven man ate brown bread, and apples to fill his stomach; by which means he reduced himself eight stones. He purged himself thrice a week, but allowed himself a pint of port or sherry daily. The baker took water-gruel and brown bread, and lost fourteen stones. In the other case, related by Wadd, on a diet of four ounces of animal food, six ounces of bread, and two pounds of liquid, a gentleman reduced himself from thirty-two stones nine pounds, to twenty-three stones. The Banting dietary is not to be compared to that of abstinence; the food taken being vegetables and hydro-carbons in the least concentrated form of farina. No doubt alkaline purgatives

are of great moment in aiding reduction. Except that it entails little that is disagreeable, Mr. Banting's plan is far inferior to those detailed above; and it is not creditable that for so long Mr. Banting could get no useful suggestion for the reduction of his bulk; and that when he did at last succeed, so dangerous a scheme should have been furnished to him. It is at once obvious that a frugal meal of matter largely carbonaceous is more effective than a liberal supply of azotized matter; which latter furnishes a considerable amount of glycogen, but with it a large quantity of nitrogenized waste; in the elimination of which the kidneys are kept functionally active, and so in time become diseased.

§ 238. The consumption of azotized food in liberal quantities and over long periods of time, as on the Banting scheme, is a great factor in the production of chronic renal disease. Doubtless there is much difference in individuals and in families; in some the tendency to renal mischief is such that small provocation sets up abnormal changes; while others again practise the greatest indulgence in eating almost with impunity. Sooner or later, however, the sustained functional activity, with its necessary hyperæmia, develops a growth of connective tissue in the kidney; just as such interstitial growth is set up in other viscera by persistent hyperæmia. By this impairment of the kidney-structure the work falls most heavily upon the parts remaining sound; and thus the disease is fostered. It is obvious, then, to any thinking person, that the first step to be taken under these circumstances, is to reduce the nitrogenized food to a minimum; and that minimum is much less than is almost universally supposed. Very small amounts of nitrogenized matter are absolutely requisite for tissue-repair. What has just been said of the dietary of Lewis Cornaro, and of the miller of Billericay proves this to a demonstration; for these men did not fall off in muscular weight, and the energy they possessed is full proof that their tissues, other than adipose, were well and sufficiently nourished. No doubt in both these cases, as well as the others mentioned above, there was a very perfect digestion, and all the food taken was assimilated—a condition by no means the rule; but, nevertheless, these cases show how small is the

amount of plastic material necessarily required for perfect histogenesis. In laying down the dietary of the gouty, these facts must be borne in mind; and the remonstrances of the patient must be gently but firmly met. To a large number of persons the pleasures of the table are the best part of their existence; and these are the very persons whose kidneys ultimately suffer for their sustained functional activity; and in whom it becomes so desirable to restrict their dietary. Great firmness is necessary, and no little caution, in the management of them. Even while conscious, in many cases, of the benefit derived from a restricted dietary, these persons will take an early opportunity of consulting some one else in the hope of prevailing upon their new medical adviser to recommend a more liberal diet scale. As it is a marked trait in humanity to believe readily what it is agreeable to believe, the advice of the less skilled man is adopted; and it is only when the consequences follow, as in time they do, that a long-deferred repentance sets in—usually too late to be of service. The question of such a dietary for gouty persons is far from being generally understood; and though a large proportion of the profession recognize the importance of restricting the dietary in such cases, still it is scarcely a living faith with them, and exercises little or no influence upon their practice. When the subject becomes better understood, a stimulus will be given to the culinary preparation of fish, vegetables, farinaceous material, fats, and oils; and the cook's skill will render palatable what science selects.

This subject becomes of great importance when we bear in mind the changes in the circulation which accompany chronic renal disease. The consequences of the blood being highly charged (ueberladen) with nitrogenized waste are, as we have seen, hypertrophy of the muscular walls of the arterioles and of the left ventricle; high arterial tension (ueberspannung) leading to those changes in the arterial coats known as atheroma; and, as a resultant sequel, a strong tendency to apoplexy from rupture of one of the intracranial vessels, and consequently again to paralysis; or to the formation of aneurysm, the result of some accidental over-exertion or of the giving way of some portion of the arterial coat, previously weakened by atheroma-

tous change. When the blood is more than usually charged with azotized waste, the usual high blood-pressure is increased, and the liability to rupture in the atheromatous arteries is doubled. On the other hand, Parkes has shown by the sphygmograph, that a non-nitrogenized diet is followed by a lowered blood-pressure, a diminished arterial tension. These two facts stand in a most suggestive relationship to each other, and point distinctly to the necessity for a non-nitrogenized diet for the gouty; especially where the vascular system is much implicated. That on such a non-nitrogenized dietary these persons should feel less energetic, and that they should complain of it as "too depressing," is only what we may fairly inductively expect; and we must be prepared to meet their murmurings, to be patient with them, and by reiteration to induce them to keep their real interests in view. By again altering their dietary such persons can at once both gratify their palate and increase the blood-pressure within the encephalic vessels, and so experience greater cerebral activity; but at the same time they must take the potential consequences. In the treatment of paralysis in those who live well, and in those in whom chronic renal mischief with its consequences exist, it is of equal importance to remember the action of food upon the vascular system; and so to avert the second attack which is looming in the distance. Much of our success in the treatment of paralysis, of cerebral origin, is due to our recognition of the importance of such regulation of the diet. It is not only, however, in those cases where the vascular system gets the brunt of the effects of imperfect kidney-action that such a dietary is of signal service; its adoption gives relief, more or less perfect, to all and every one of the myriad outcomes of the Protean malady—gout. Of course, in all cases the use of mineral waters, especially of those containing potash, as a daily habit; the regulation of the bowels, together with decided purgation at brief intervals; and a well-maintained action of the skin, by which means the imperfect action of the kidneys may be compensated; are all of service. Nevertheless, the regulation of the diet-scale is the first and foremost matter.

§ 239. Under the heading of Diabetes, the diet suitable to that malady was given. It need not be repeated; but some-

thing may be said here as to the dietary to be adopted by those who suffer from diabetes, while being at the same time the subjects of chronic Bright's disease—a very considerable class. With such patients the liberal amount of animal food usually permitted to diabetic patients would be a source of no small danger. The farinaceous foods in stinted quantities, vegetables, salads with oils; or fish, few potatoes, and much butter, the fat of meat; and other aliment containing but limited amounts of nitrogen, are here clearly indicated. Not rarely too such persons are inclined to obesity; and then the problem to be solved is indeed a complex one. Here there is the tendency to put on fat to be taken into consideration; and, on the whole, the dietaries of Cornary and his allies are the fittest to be adopted.

However distasteful, abstinence must be practised, both as to quantity and quality. Boiled rice with stewed fruit (though containing small quantities of sugar-producing material), spinach, salad, lettuces, fish, other articles of food which will give bulk to meet the cravings of the stomach, and yet do not supply nutrition in too liberal quantities; are the forms of food to be chosen. How far in such cases alcohol is desirable will perhaps be a matter for the exercise of the right of private judgment; but it is a form of food which does not furnish much combustion-matter, and, from its stimulant properties, is desirable, as it relieves the depressing and lowering qualities of the Spartan fare indicated. A limited amount of alcohol in these cases then is not objectionable. The plan of Ebstein of cutting down the carbo-hydrates and substituting for them fat (which is not laid down in the body as fat, but is burnt) is at once more rational than Bantingism, and in practice more satisfactory.

Such are the leading indications for the medicinal use of food; both in the treatment as well as in the prevention of disease. The subject is one of high importance; and this importance is being rapidly recognized. It will be forced upon the attention of the profession ere long, as much by the highly educated laity outside as by the persistent admonitions of physiologists. It will, however, be a stubborn battle between scientific knowledge, on the one hand, and the cravings of the palate, the pleasure of a sense of intellectual activity, and even the necessities of the individual, on the other—a man may have

to kill himself to get a living. As life wears on the capacity to grapple successfully with large quantities of rich food declines, while synchronously the power to purchase it usually increases; the modified enjoyment of other pleasures leaves that of the table more vivid; and if it were not for the protection of indigestion, of which many so bitterly and ungratefully complain, the lives of a large number of individuals would not attain their furthest potential expansion. As Age lays his heavy hand upon the organism the taste for animal food commonly undergoes a natural and spontaneous reduction, and the diet of childhood is usually instinctively adopted. This is part of the natural conservatism of the system, which often shows itself with remarkable distinctness; and points out to the careful therapeutist, paths in which he may wisely follow. The tendency of the present age is towards the keeping-up and sustaining line of practice; and we might in many cases adopt with advantage some of the lowering treatment and slop-diet to which the last generation inclined. Then there is a large class of articles consumed whose food-value is very low, but which are valuable as anti-scorbutics; and without which we would suffer from scurvy. Vegetables and fruit are thus important matters of our dietary, especially when milk and fresh meat are unattainable.

§ 240. After this consideration of food in its relation to the body-force and the requirements of various individuals, not only in conditions of health, but in certain abnormal conditions, the question of drinks may well be entertained. They present different aspects; and can be regarded from the different standpoints, as of food in a fluid form, as stimulants, beverages, pyretics, and apyretics, and again simply as water.

To take them in the order they thus stand; we come first to milk, which contains in itself all that is required for the wants of the organism. There is in it fat, nitrogenized matter, sugar, and salts. It is palatable when fresh, and usually easily taken by most persons. To some, however, it is a subject of repulsion; and for such persons some substitute for it must be found. To others, again, it is constipating; but this may usually be corrected by mixing it with seltzer-water; so treated, it forms a most agreeable beverage; and many persons who find milk

alone too heavy for them can take it with a relish, and digest it well, when so treated. Ordinarily milk is best in its fresh state; but in diabetic conditions the best form is that of butter-milk, where the milk-sugar has been broken up into lactic acid: this is an agreeable beverage when properly prepared, and ought to form a large portion of the dietary of the diabetic in the country, or indeed anywhere where butter-milk can be procured. During pyretic conditions milk, alone or with some mineral water, should form the chief food; and recent observations in various fever-hospitals bear out this strongly. In convalescence, especially in its early stages, and in conditions of great debility, milk is the food *par excellence*. It supplies nutriment, both plastic and respiratory, in suitable proportions; and is infinitely superior to beef-tea, or alcohol as a food. When something more substantial, and yet in a fluid form, is indicated, milk may be thickened with corn-flour, and then have an egg beaten up with it and some sugar added. This forms a famous meal, and is excellent in certain forms of gastric catarrh. At times some preparation of alcohol may be added to milk, either plain or combined, as just described. Such is the famous rum and milk of world-wide repute. To prepare it properly, however, it is necessary to add some other ingredients. Taken in the morning early, this draught enables the invalid either to have another nap, or to dress and then enjoy, and digest breakfast afterwards. In convalescence it is often very useful; while to many a phthisical patient it has simply been life. As custard, egg and milk form a pleasant food of a highly nutritive character.

The next form of nutritive fluid is beef-tea. Beef-tea, at present, holds a more exalted position than that to which it is lawfully entitled. Many persons, too, think it an article which cannot be abused; but this is a mistake. Its first abuse is, that it ranks far too high as a food; its second abuse arises from its stimulant properties.

As a food, beef-tea ranks low. It contains meat-salts, a small quantity of albumin, and a little gelatine, together with some advanced nitrogenized matters, useless in histogenesis. But there is little in it to repair tissues, and less in it to sustain life; as far as our knowledge yet extends. There is little real force-bearing material in the protean compounds of beef-tea. Little

actual force is evoked by the oxidation of nitrogenized compounds in the body. For the starving fever-patient, to give him beef-tea alone, is almost to give him a stone when he asks for bread. It makes him feel better for the time being; but that is due to its stimulant properties. We have seen above how nitrogenized matter acts upon the nerve-centres and evokes energy. But then it is not wise to evoke manifestations of energy, without supplying force-producing material—this is a means of artificially inducing exhaustion. Alcohol is a force-producing hydro-carbon as well as a stimulant; and if a manifestor of force, at least brings something to the body-fund; but beef-tea alone does not do this last, or if so, only to an infinitesimal amount. To give beef-tea, as is often done, in the earlier stages of fever or other ailment, is often to induce exhaustion sooner than it would otherwise have come on. Doubtless the sufferer feels refreshed by the beef-tea—personal experience leaves no doubt upon that head; but then this feeling is produced by the consumption of some of the body-store of force; and so far is a loan, and not a gift. It is here that beef-tea falls so far short of milk, which furnishes force-producing material. By the exhibition of beef-tea in liberal quantities—under the amiable delusion that, because the patient feels better, brisker, and livelier after it, therefore he is better—many a patient is exhausted, and rendered physiologically bankrupt—his fund of body-force dissipated and squandered in aimless and useless manifestations of energy—ere the hour of need and the time of trial arrives. Instead of nursing carefully and husbanding his force till the severe trial of the critical period arrives, it is wasted; and then exhaustion follows. It reminds one of the well-meant, but vicious action of ignorant neighbours and nurses in a first confinement. They smuggle spirits in a cup of tea, if they are afraid of the watchfulness of the medical attendant; or on some pretext get him out of the room, and then administer alcohol; and encourage the patient to make voluntary efforts in the first stage, when they are simply useless; and then, when the second stage comes, and these displays of voluntary effort would be useful and desirable, they are not forthcoming; the force that is then so desirable has been spent and wasted: and often it becomes necessary in such cases to

apply the forceps to complete delivery; when, if a better knowledge had existed among the women in attendance, no such procedure would have been necessitated. Just in the same blundering way, some well-meaning, officious attendant squanders the body-capital in useless, profitless displays of energy in the early stages of acute maladies; and so ultimately wrecks the patient. These remarks are not unnecessarily strong; and are certainly called for by the ignorance of some persons, and the disinclination to think on the part of others. Beef-tea has become, in one sense, a trouble at present; not only is harm done by its agency, but its use prevents the more serviceable milk from being more largely used.

If, however, beef-tea is given with sago, or perhaps even better still with arrowroot, which goes thin on boiling and so drinks clean, it possesses some force-producing material; and so something is furnished to the fund of body-force, in lieu of that force which is expended by the stimulant action of the nitrogenized matter. If biscuit-powder and a little butter with pepper and salt are added, or fine bread-crumb, beef-tea is a food. During a pyrexia, especially if there is difficulty in swallowing, arrowroot and beef-tea alternately with milk should form the chief sustenance; sometimes it may be desirable to suck the fluid through a glass tube, if deglutition is difficult. Another pleasant beverage possessing nutritive properties is rice-water, the well-known "cungee-pawnee" of Hindoostan. Where there is diarrhœa, rice as rice-water, or ground rice boiled and mixed with milk, beef-tea, and mutton-broth, are suitable. Whey, cream diluted with seltzer or rice-water, or with soup, or beef-tea, are pleasant forms of food; and with these different fluid foods ice may be given, so as to convert the beverage into an antipyretic. When given with some form of starch, with sugar, or with fat, beef-tea is a valuable addition to the dietary of the invalid; and loses the objections which are valid and well-founded against it in its simple form. When added to the farinaceæ and other foods, gelatine has been found by Voigt to be capable of digestion; but the conclusions of the French commission as to its uselessness in the form of jellies still hold good when it is given alone.

In speaking of beef-tea it is assumed that it is properly made,

i. e. that some portion of meat-fibre has been beaten in a mortar to a paste and then restored to the tea. As ordinarily made beef-tea consists merely of extractives (kreatin and kreatinin) and some salts, and does not deserve the name of a food, so infinitesimally small is its food-value. It has the same ultimate composition as urine, and is simply a pleasant beverage or food adjunct. It is agreeable to the palate, and acceptable to the stomach. It can be made to possess a distinct and measurable food-value by adding to it any of the many prepared foods consisting of soluble carbo-hydrates and some albuminoids. The following formulæ for preparing essence of beef may be found useful :—

Essence of Beef, No. 1.—Take one pound of fresh beef, free from fat, and pour over it half-a-pint of soft water, or rather less; add five or six drops of pure hydrochloric acid, and half-a-teaspoonful of common salt. Stir it well, and leave it for three hours in a cool place. Then pass the fluid through a hair sieve, pressing the meat slightly, and adding gradually towards the end of the straining a little more water. The liquid thus obtained is of a red colour, possessing the taste of soup. It should be taken cold, a tea-cupful at a time. If preferred warm, it must not be put on the fire, but heated in a covered vessel placed in hot water.

Essence of Beef, No. 2.—Take one pound of gravy beef, free from fat and skin, chop it up very fine, add a little salt, and put it into an earthen jar, with a lid; fasten up the edges with thick paste, such as is used for roasting venison, and place the jar in an oven for three or four hours. Strain through a coarse sieve, and give the patient two or three teaspoonfuls at a time.

Essence of Beef, No. 3.—Take one pound of gravy beef, free from skin and fat, chop it up as fine as mincemeat, pound it in a mortar with three tablespoonfuls of soft water, and let it soak for two hours. Then put in a covered earthen jar with a little salt, cementing the edges of the cover with pudding-paste, and tying a piece of cloth over the top. Place the jar in a pot half full of boiling water, and keep the pot on the fire four or five hours. Strain off through a coarse sieve (so as to allow the smaller particles of meat to pass) the essence, which will then

amount to about a quarter of a pint. Give two or more table-spoonfuls occasionally.

When a peptonized preparation is required the following recipe will be found reliable :—

Take half-a-pound of finely-minced lean beef, add to it a pint of cold water, and cook over a gentle fire till it boils. Decant the liquid portion into a clean jar or into a bottle, rub up the meat into a paste, and add it to the beef-tea. Add more water, till the temperature is reduced to 140° F., then stir in a drachm of zymine, and twenty grains of bicarbonate of sodium. Then stand it before the fire for three hours, shaking occasionally, and finally either place it on ice or boil quickly for a few minutes, and strain. (Murrell's *Pharmacology and Therapeutics.*)

§ 241. As stimulants, fluids are commonly administered to the sick, the weak, and those who have just been exposed to some shock, or injury. In the giving of stimulants, we unlock a certain amount of the body-fund of force. This is unquestionable; though alcohol furnishes some force in its oxidation within the system. In giving fluids as stimulants, this must be remembered; and tea, coffee, sal volatile, and chloric æther do not possess the force-producing hydro-carbon of alcohol. In combination with rich cream and sugar, tea and coffee may often be given with advantage, especially in convalescence. Vogel speaks highly of coffee so treated, as a useful stimulant in the affections of childhood. It is unnecessary here to go again into the action of stimulants at length; suffice it to say that the administration of stimulants, alcoholic or nitrogenized, should always be in proportion to the reserve fund of the system, and the pressure of the emergency. Sometimes, it may be neck or nothing; and an apparent recklessness may really be the most prudent and the wisest course—the patient must be tided over the perils of the hour, no matter at what cost. At other times, however, it is desirable to look forward a little, and not to subordinate the future too much to the present. It is of little use for a ship to round a point only to drift helplessly ashore in the bay beyond. Many patients sink, when the turning-point has been passed, from sheer exhaustion; for want of that force which has been expended already—maybe in useless displays of energy, in manifestations of force which have

served no useful purpose. Such, it is to be feared, is too much the case with the modern treatment of disease, and the therapeutics of the present are far too saturated with the brandy and beef-tea theory. What is indicated is the greater use of force-producing food, and less of the mere manifestors of energy, in our treatment of acute disease. We want, in fact, better and more trustworthy physiological notions than at present obtain. The once fashionable Liebig's extract of beef is a stimulant, or a flavouring agent, rather than a food. It gives a pleasant character to farinaceous preparations, or forms an agreeable beverage when mixed with cold water; but it is scarcely a food. It is useful to render food palatable, and in so far is not to be despised. As a food it ranks below well-made beef-tea, though it is superior as a flavouring agent. Stimulants should be subordinate and ancillary to food in cases of debility in the young, whose evolution is retarded; in the dyspeptic; and in the general failure of senile decay. In such cases it is much wiser to reduce the demands upon the system to the capacities of the organism, in proportion to its diminished powers, than to erect an ideal standard to be aimed at, and then to whip up the bodily powers with alcohol and nitrogenized material until the patient feels as he would wish to feel, or an approach to it; and can do more or less what he wishes to do. By such means the system is exhausted before its time; and though, according to the ancient saw, "It is better to wear out than to rust out," still, the latter is usually much the slower process.

Finally, our treatment has at present a decided tendency to assume a character too distinctly stimulant, and not sufficiently nutritive and restorative. Stimulants should be auxiliary to food, in whose assimilation they often assist; in themselves they furnish little, and often no force-bearing material. They are, however, a means of reaching the physiological reserve fund of force, and consequently may be advantageous or pernicious, according to circumstances; and an ill-regulated or excessive process of stimulation may give results as disastrous, as a prudent and intelligent resort to stimulants may be beneficial and preservative.

There are conditions of the system when alcohol is almost the only food the patient can take, and when exhaustion is threaten-

ing then a full dose of alcohol must be administered. This will often also allay the irritability which indicates and is the precursor of exhaustion, and the patient will drop off to sleep. This is "the narcotic dose of alcohol," which however also furnishes a certain amount of readily oxidizable material to the system. When thoughtfully and skilfully used, under these circumstances, alcohol may be ranked as one of our most potent therapeutic measures. But to proceed from such consideration of the value of alcohol in disease to that of its food-value when taken as a beverage, is to talk unmitigated nonsense. Before a man could take a substantial meal of alcohol he would be simply dead-drunk, if not killed outright.

§ 242. As beverages, fluids are in universal use both for the healthy and the sick. They consist of water with or without other constituents. As rice-water, barley-water, &c., beverages are also foods. When consisting of vegetable juices as well as water, beverages are often useful as well as grateful. Thus in grape-countries, grape-juice, or must, is a favourite beverage; and from the amount of sugar contained in it, a small quantity of nitrogenized matter, and some salts, this must will often be found an agreeable beverage, possessing high nutritive properties; and can be iced without detriment to its qualities. The strawberry and raspberry syrups in such vogue in Dresden are also pleasant beverages. The potash in the strawberry renders its juice a desirable drink for the gouty and for strumous children. The juice of the apple and pear when fermented forms most agreeable beverages, possessing stimulant properties from a certain percentage of alcohol. The various preparations of the grape which we consume as wine are well known and appreciated. In pyretic conditions acid wines are very desirable, and were largely used in the Franco-German war in fever cases, with excellent results. Taken with food, a glass or two of generous wine, as Burgundy, Marco Brunner, Sauterne, or sherry, are often very useful in aiding digestion; and champagne possesses, like all sparkling wines, stimulant properties not to be measured by the proportion of alcohol. Often too a glass of port after a meal is useful. As beverages we also use preparations of malt, the well-known ales and stouts, of every variety of alcoholic strength. They are also used with

meals by many with advantage; but when prescribed for invalids care should be taken to see that they are in good condition, fresh, if from the cask; well up, and with a head, if bottled: stale malt liquors, and flat bottled beverages are repulsive, and consequently objectionable to the invalid. Spirits are rather pure stimulants, and are not so much in vogue at meal-times. Nevertheless, with some persons a little brandy-and-water at meals is preferable to wine or any other beverage. Spirits are often used as beverages now with some form of mineral water, and as such may be taken in conditions of debility and exhaustion; though perhaps inferior to a draught of wine. In the evening ere going to bed they form a useful nightcap for those who have not only worked hard during the day, but been subjected to worry; and often secure for such persons sound refreshing sleep.

Water, too, simply as water, is an excellent beverage, in which most persons might indulge more freely with advantage. From the effects of perspiration in warm weather, from the calls of the bladder in society, numbers of persons take an undesirably small amount of fluids; not nearly sufficient for the real needs of the body and the removal of waste. In adults the tissues are often much in need of being well washed by the permeation of water through their structure; and the advantages which we saw, in the last chapter, to attach to wells and watering-places lie no little in the increased consumption of water by those visiting them. After the experience of a fashionable season, of a festive time, or of a series of dinners, a course of water with abstinence is often most beneficial.

§ 243. Fluids too are often a ready and effective means of affecting temperature. In cold weather an increment of heat is furnished by hot fluids, as soups; and so waste of tissue for heat-production is economized. Especially after exposure to a low temperature, or when the body is chilled from any cause, draughts of hot fluids are very useful in restoring the body-temperature. In collapse they are often of great utility: and they are equally serviceable in the production of perspiration in addition to the warm bath. We have for generations been in the habit of supplying hot fluids in a rational way: but it is only since the importance of variations of the body-temperature

has been enforced upon us by the use of the clinical thermometer —and the evil consequences of a rise above the normal body-heat have been thereby demonstrated—that the use of chilled fluids has obtained. For ages the practice of chilling waters, and the use of ice for cooling beverages, have been indulged in by the affluent; but the application of ice to the reduction of fever in the sick in humble life is of modern, indeed recent, origin. A pronounced impression can be made upon the body-temperature by draughts of cold fluids, and this can be repeated in pyretic conditions. In exposure to great heat, or after much exertion, iced fluids are very grateful. After much exertion in a high temperature so that exhaustion is approached, it is well to drink iced or chilled fluids, but slowly and in small quantities at once; as large draughts are sometimes followed by disastrous consequences. Large draughts of cold water at meals are also subject to abuse, especially in certain dyspeptics, where the cold checks the digestive processes.

On the other hand, in febrile conditions, and in very hot weather, iced fluids are grateful and free from objection. There is, however, on the part of imperfectly-instructed persons an unfounded dread of cold fluids; and a well-meaning mother will often torture her fevered child in a negative, yet effectual way, by withholding from it the cool fluid for which it craves. Such conditions are often combined with anorexia, and under these circumstances milk, rice-water, &c., chilled, are excellent means of feeding the child, by taking advantage of its thirst. As people advance in life they become less tolerant of iced fluids; and with the aged they should be used with caution, especially if the heart be weak.

This it is the more necessary to insist upon since the greater consumption of iced fluids has set in, as it has done of recent years. Such iced fluids, especially if the material of the fluid be some mineral water with an admixture of wine or spirit, are excellent in hot weather; still more where there is some accumulation of uric acid from imperfect oxidation. The daily consumption of a mineral water containing potash meets the continuous production of small quantities of uric acid, neutralizes it, and renders it soluble; and thus in solution it drains away in the fluids of the body. The excessive resort to alkaline

waters by non-gouty persons is not uncommonly the cause of much discomfort and gastric debility.

§ 244. Not only is the food we consume of importance in the treatment of disease, as we have just seen, but it has further been essayed to treat diseases solely by a diet-cure. Such, for instance, are the grape-cure, the whey-cure, and the koumiss-cure.

Grape-juice contains a large quantity of sugar, some gum and albumin, with tartrates and phosphates of lime and potassium. In a large class of cases, especially with a lithæmic element about them, grapes form an excellent form of food. At first the grape-cure produces purgation, and this is often very useful, if not too pronounced; and always has a tendency to keep the bowels open and to unload the portal circulation. Knowing as we do the association betwixt biliary congestion and a large amount of lithates in the water, such action of the grape-cure is most excellent. As the grape-juice also acts upon the kidneys, and other food is almost entirely forbidden, a perfect depuration of the system is induced; especially valuable where the amount of food taken has been for long and persistently in excess of the needs of the system. In abdominal plethora and in catarrh of the digestive organs, the grape-cure is often beneficial. It is not adapted to debilitated conditions, especially in children and in delicate women; it is a reducing agent, chiefly adapted to men and women of full habit. Of course it can only be conveniently undergone during the season when the grapes are ripe. In Europe, America, the Cape, and Australia, where there are vineyards, especially in healthy places and amidst pleasant scenery, such grape-cures are to be commended. Strawberries are rich in potash, and contain iron; therefore in similar cases of lithic acid tendencies the strawberry-cure of anterlachen is often to be advised, or prescribed with benefit. By the addition of milk and cream, where the strawberries alone are too reducing, or afford insufficient nourishment, a pleasant dietary is furnished, suitable to many invalids.

Milk-cures are as old as the days of Galen, who sent strumous patients to the milk-cure at Stabiæ. In Switzerland the milk-cure is common, and there are several places where it is conducted on a large scale. When milk alone is too constipating

it can be combined with seltzer water. This plan is rather suited to cases of anæmia depending upon imperfect assimilation; and in such cases often works marvels. In atonic gout it also is useful. In cases of threatened tuberculosis the milk-cure in some health-resort, as in the Upper Engadine, is very good, and often wards off serious illness. In ulcer and catarrh of the stomach milk may advantageously be made the sole food.

Preparations of milk are also used. Whey has long been in favour. It contains the salts of milk and the sugar, freed from fat and caseine. It is especially adapted to the gouty and plethoric. By combining it with milk it becomes more nutritive. Like most of these cures, it secures a small amount of nutrition with much fluid, and therefore suits two classes of people: the plethoric, who consume and digest too much; and those whose digestions are feeble, and who require their nutriment highly diluted, and in a diffused rather than a concentrated form. Care, however, must be taken about these latter cases in order that no mistake be made; for it is impossible always to be sure in cases of weak digestion that a dry diet instead of a highly-watered one is not rather indicated.

Butter-milk is also used for dietetic and even therapeutic purposes. In it the milk sugar is broken up into lactic acid; and therefore butter-milk is well suited to the diabetic, especially if it contain numerous tiny flakes of butter in it. In some conditions of chronic Bright's disease it is also useful.

Milk prepared as koumiss is a pleasant fluid, containing fat, caseine, milk salts, lactic acid, some alcohol and carbonic acid gas. It agrees well with many cases of enfeebled digestion; and is well suited for the treatment of pyretic conditions, as well as conditions of more permanent debility. It is in vogue in Russia, at several places in Germany, and at Eaux-Bonnes. Junkets and sillabubs are mixtures of milk variously modified with alcoholic and spicy additions. Collectors of recipes speak of Devonshire junket, Staffordshire and Somersetshire sillabub, and of lemon sillabub. Thudichum, in his useful and interesting *Spirit of Cookery*, gives not only an explanation of the origin of the terms, but of the most approved methods of preparing these different specialities.

Such are the special forms of cures accomplished by adaptations

of certain forms of ordinary food. They are pleasant, and, from the reasons given above, well adapted to the successful treatment of many conditions. Not only are these cures good in themselves, but they also point out in a very distinct manner the great importance of a well-adjusted and suitable diet for many persons as a preventive of disease. In diabetes and gout we find that the question of diet is one of primary and cardinal importance; in the treatment of struma and tuberculosis it is of no less moment; and in many conditions of debility with impaired digestion it is no slight matter to select a suitable dietary, and to supply food in a form at once nutritive and digestible.

As there are many persons who cannot take milk in any shape, and yet for whom food in a fluid form is absolutely necessary, it is often of advantage to know of some other fluid-food to fall back upon. The following combination was almost the sole food of the Duke of Gloucester for a long time. Of rice, well washed, of arrowroot, tapioca, and pearl barley, take each an ounce; add two quarts of water, and boil down to a quart; then flavour with candied eringo. This is palatable, and will often be found very serviceable.

A still better substitute may be made as follows:—Pour a pint of rice-water upon a tablespoonful of a mixture of fine almond flour (4 ozs.) and prepared sugar of milk (2 ozs.). The latter consists of sugar of milk, 13 ozs., powdered lump sugar, 2 ozs., and 1 oz. of a combination of salts, of which this is the formula—chloride of potassium, 6 ozs., phosphate of soda, 3 ozs., phosphate of magnesia, 2 ozs., and phosphate of iron, 1 dr. The rice-water should be poured on boiling hot, and the mixture well stirred; after this it should cool and then be strained through a sieve. This forms a very milk-like fluid, both to sight and taste. It also contains a good quantity of fat in fine emulsion, and is almost identical with milk under the microscope.

Peptones themselves are inoffensive to taste or smell, but the by-products of digestion are such as to make artificially-digested food offensive to the palate. When a powerful pancreatic extract is added to milk two-thirds of the caseine is peptonized in the first half-hour, and three-fourths in the first hour; but

it takes another hour and a half to peptonize the remaining fourth. At first the milk thickens and becomes softly curdled, but in half-an-hour regains its normal appearance. A temperature of 157° Fahr. arrests the action of the pancreatic ferments. By means of a pancreatizing agent, milk can be digested outside the body without being made offensive, if the action be stopped at the end of a certain time, by raising the mess to the boiling-point. The proper temperature at which the milk so treated must be kept is below 157° Fahr., else the ferment is destroyed. No fluid can be sipped even which has a higher temperature than 150° Fahr., so that a thermometer is not essentially necessary to correct treatment of the milk. It is easy enough to prepare peptonized milk. Take a pint of fresh milk, dilute it with a quarter of a pint of water, pour it into a bottle, add a zymine powder which contains five grains of zymine and fifteen grains of bicarbonate of sodium, and after well shaking let it stand in a warm place, before the fire or in a basin of warm water for example, until it acquires a slightly bitter taste. This usually takes place in about twenty minutes, when the bottle should be allowed to stand on ice so as to temporarily arrest further fermentation. In cases of gastric ulcer where vomiting is readily excited, this preparation may be given in teaspoonful doses frequently repeated, but where no such difficulty is met with it may be administered freely and may be used as a basis for many other nutritious preparations.

Such artificially-digested food is indicated in actual disease of the stomach, in dyspepsia, in convalescence from acute disease, as well as in acute disease itself, and in several other conditions where it is likely to be most useful.

CHAPTER XXIV

THE DIETARY IN ACUTE DISEASE AND MALASSIMILATION

§ 245. The transformation of starch in the body into the soluble matters dextrine and maltose, under the action of diastase, has led to the use of predigested foods—at least predigested to a considerable extent—in acute disease as well as in cases of malassimilation. Indeed a competent knowledge of the subject as regards the first is quite as important as it is as to the last.

The first part of digestion is the conversion of starch into soluble matter so as to diffuse readily through the wall of the alimentary canal into the blood. This transformation is brought about by the diastase of the saliva. A precisely similar change goes on in germinating seeds, and of this fact the chemist has taken advantage. He saw that it was possible to utilize the diastase of cereals for the needs of man. In the process of malting (which is the rapid germination of barley) the starch of the grain is converted into dextrine. The malt is not heated above 180° Fahr., or thereabouts, so that a considerable portion of the diastase remains in an active state. When the malt passes on to the brewer in his mash-tub this diastase acts further upon the dextrine and converts it into maltose, or grape-sugar; which in turn is fermented by the addition of yeast, and so gives us the ale of which our Norse ancestors were said to be somewhat too fond. In the preparation of a malt-extract the process stops at the point where the brewer adds the yeast. The fluid portion of the mash ("wort") is boiled down in a vacuum pan carefully, and the resultant product, known as malt-extract, contains a quantity of maltose, some dextrine, and a certain amount of active diastase, some

soluble albuminoids, and salts. If such malt-extract be added to farinaceous material, as a rice-flour milk-pudding, before being eaten, it will convert much of the starch into dextrine and maltose. As it is a pleasant thing, something half-way betwixt honey and treacle, it rather improves the milk-pudding than not. Or it may be taken as it is, at the time the farinaceous matter is being eaten, so as to act before the stomach becomes acid; for an acid kills diastase at once, as does a temperature over 188° Fahr. Such is the use of malt-extract as an artificial digestive agent; but there is another aspect of this subject.

The process of malting is one of the conversion of starch into soluble matters, and in so far is identical with its digestion in the human body. Malt-extracts are then admirable foods in themselves, and of inestimable value in many cases of disease. As a food, malt need not be prepared by the expensive process required to keep the larger quantity of diastase which is to be found in a really good malt-extract. The conversion of starch into dextrine has made a mighty alteration in its digestibility, and a malt preparation requires but little of the digestive act. Such malted foods can be added to a farinaceous milk-pudding, before being put into the oven, with advantage. Plain ground malt also may be used. These malt preparations go better with milk rather than with meat-broths.

When wheat-flour is exposed to a high temperature for some time, not only is the starch granule cracked, but a certain change goes on in the starch itself, by which it is rendered more readily soluble. It is, indeed, largely converted into dextrine. Consequently we see how baked flour is infinitely more digestible than raw or uncooked starch; and can understand how a milk-pudding, made with plain biscuit best (Captain's biscuit) broken up, is more digestible than one made with starch which has not previously been exposed to a high temperature. All prepared foods for babies and invalids, or dyspeptics, consist of malt or baked flour, or both. Such baked flour can be added to beef-tea, and gives it a decided food-value. All meat-broths, to form a food worthy of the name, should have some baked flour added to them, otherwise we are practically giving the patient a stone when he asks for bread, or in other words

starving him. All meat-broths should have some baked flour, or powdered biscuit, or ground malt, added to them when it is desirable to give nourishment as differentiated from a mere fluid, or beverage for the slaking of the thrist. Tamarind-water, apple-water, and allied fluids are drinks; but here the subject of food is being discussed.

The dietary for a person stricken down with acute disease should, then, consist of something more than beef-tea, and milk and seltzer water; admirable things in their way, but somewhat monotonous. Milk is liable to form a firm curd in the bowels, and so not only loses its nutritive power to a large extent, but the masses of firm curd irritate the bowels; especially in enteric fever, where it becomes a source of great danger to life. Milk and seltzer water, or Vichy water, will do well either with a malted food or without it. Beef-tea, or mutton, or veal, or chicken-broth with some baked flour have a distinct food-value, and are nutritive as well as palatable. Meat-teas indeed sit pleasantly upon the stomach. These different forms of food just mentioned are suited to the gravest forms of acute disease when no other food is admissible. They make the minimum of demand upon the digestive powers, which are much impaired in acute disease. When an individual is severely ill the digestive powers share in the general condition, and consequently the food supplied should be of the most easily assimilable character. Starch agrees only on the conditions that it is taken in small quantities, and that the saliva is in a state to do alone what generally it has the small intestines to help it in doing. If the secretions of the mouth are deficient, it will not agree. Hence, in low fever, where the fauces and tongue are dry, you will rarely or never order arrowroot, bread panada, gruel, potatoes, or any other amylaceous food. When they are eaten they will be found unaltered in the fæces, and not rarely cause considerable aggravation of the symptoms. By resort to predigested starch, which is soluble, the patient is at once fed, and the evil consequences of insoluble undigested starch are avoided. Hence the advantage of prepared foods as malt-extracts.

§ 246. Assuming that the worst is over, and that the patient is convalescing satisfactorily, the dietary will need some modi-

fication. Not only will carbo-hydrates be necessary, but the system will require some albuminoids to repair the tissue-waste which has gone on during the pyrexial stage. This will involve the matter of gastric digestion. This is the second step in the digestive act. It may be a somewhat startling statement to some readers that disintegration is the great work of the stomach rather than digestion; but disintegration is the precursor of solution—it must be borne in mind. As regards solution the gastric juice only acts upon albuminoids. Consequently any undigested starch in the stomach only impairs its action. Such starch is not affected until it comes in contact with the diastase of the pancreatic secretion. It is still necessary then to give starch that has either been exposed to the malting process, or to a high temperature kept up for some considerable time. For this end it is well to have the soup, as plain gravy soup, or a meat-broth, or a white soup, thickened with broken Captain's biscuit, or other predigested starch; so that the soluble carbo-hydrates will readily diffuse through the walls of the alimentary canal. Dextrine and the soup made from meat act as a peptogen, and so furnish the stomach with the requisites for its own solvent juice.

Then come the albuminoids proper of a meal which may be given in a predigested form. The albuminoids should be given in the most digestible form, *i. e.* in a form where the individual fibrillæ will readily fall asunder. Such is the fibre of white fish, as whiting, haddock, cod, and the flat-fishes. Then comes the breast of a chicken, the short-fibred flesh of game, and next, perhaps, the rabbit. The chicken purée is prepared in this way: —The meat should be cut up fine, and simmered in a saucepan until it is pulpy and sufficiently soft to pass through a hair sieve or tamis cloth. Sometimes it is necessary to pound the meat with a pestle and mortar before it can be got to pass through the sieve. Place the sieve upside-down on a dish, put the meat on the sieve, and then proceed to rub it through the sieve by means of a spoon or a stick with a rounded end. It may be necessary to add a little water, milk, or other liquid, in order to get the purée to pass the easier. The meat in a purée is in the finest possible state of division, and is consequently in a very digestible condition. A purée may be made of any

kind of meat; but that prepared with chicken is most easy of digestion and is most palatable.

Of ordinary meats, mutton comes before beef, and beef before veal and pork. Glandular masses like the sweetbread are readily digested, and so is tripe. A little white fish may precede, with some good melted butter, to which may be added some anchovy sauce. Probably the stomach will be able to deal with such a meal even when still feeling the effects of the storm which has passed over the system. When the stomach is weak, either in early convalescence or in a more permanent state of dyspepsia, it is well to aid it by some artificially-prepared pepsin. By such means the solvent action of the gastric juice is aided.

Eggs are an important article of dietary for the convalescent, and poached eggs, *œufs au gratin* and *œufs au miroir*, are usually well taken by the patient. An omelette is good if well made, and it is astonishing how few nurses know how to make it. The first essential in making an omelette is to be sure that the frying-pan is perfectly clean, and free from moisture. Place in the frying-pan about one ounce of sweet butter; break three eggs separately, and see that they are fresh; beat them up with a little chopped parsley and a pinch of pepper and salt. The eggs should not be beaten too much (about four seconds will be sufficient), or the whites will separate and make a watery mixture, which destroys the flavour and appearance of the omelette. Now that the butter is melted, and in a state of froth, pour into the frying-pan the omelette mixture, and stir till it begins to set and thicken. Shake the pan occasionally; and when sufficiently firm, fold the omelette over neatly into an oval shape; strike the handle of the frying-pan so as to produce a gentle vibration, which keeps the omelette detached from the pan, and when the omelette is of a golden colour, turn it quickly in the dish. To be able to prepare a plain omelette is to be able to prepare every kind of omelette. The chief thing to be borne in mind in cooking an omelette is that it must not adhere to the frying-pan.

The following is useful as a variation:—

Omelette Soufflée.—Six yolks of eggs, six ounces of castor sugar, a pinch of salt, a tablespoonful of chestnut flour, and a

little vanilla or lemon essence; beat to a creamy batter in a basin in a cool place, then mix in lightly nine whites of eggs beaten to a froth; pile this as neatly as possible on to a fire-proof white china dish, bake for a quarter of an hour, and serve instantly.

In the stomach no digestion of fats goes on: but the albuminous capsules of the adipose tissue are dissolved, so that the free fat can be acted upon by the pancreatic secretion.

After this second course the invalid requires a pudding. Now this is a very important matter. It is needless to say that all solid puddings are out of place here; what is wanted is a milk pudding, *i.e.* a pudding made with some sort of farina and milk. It may consist of corn-flour, of sago, tapioca, semolina, or rice. If made of these materials, it is well to subject them to a high temperature for some time before making the pudding; or it may be made of a prepared food. In the latter case it is very digestible; or it may be made with broken Captain's biscuits, and milk. To such a pudding it is well to add some ground malt. If this be done, and the pudding be placed for some time in a warm place, the diastase of the malt will act to a great extent upon the altered farina. Not only does this make the farinaceous matter more readily digestible, but it makes the pudding sweet to the palate, without the addition of cane or beet-sugar at the hands of the cook. Such cane-sugar readily undergoes acetous fermentation in the stomach, which maltose does not. This is a great matter with many stomachs. Maltose is free from that untoward change—the acetous fermentation. Maltose is a form of sugar which does not ferment, and will not give rise to acidity and dyspepsia. Or a custard of egg and milk may be made, and instead of ordinary sugar, some ground malt may be added. Such, then, would be a suitable meal for a convalescent, or dyspeptic person.

§ 247. But how about fat? Fat is not affected until it comes in contact with the pancreatic secretion. Consequently it need not be taken until the time of its digestion approaches, that is when the contents of the stomach are passing through the pyloric ring. When taken with the other food it is apt to offend some stomachs, and to furnish some acrid irritant fatty acids. If it does not so offend it may be taken with the other

food, as butter with a digestive biscuit; or stewed fruit and cream. If not easily assimilated, then about an hour and a half after a meal (of highly digestible character), fat may be given as cream with a little Maraschino or other flavouring; or as a fat emulsion, or as cod-liver oil. The last is nothing more than the most highly digestible form of unemulsionized fat. An emulsionized fat, natural as cream, or artificial, is probably really better for healthy tissue growth, and is certainly more palatable than cod-liver oil. Let it be a fat in some form; and especially a form inoffensive to the individual's palate. Some have great faith in mutton fat crumbled fine, and mixed with milk and boiled for some time. Whatever the form, it should be given at that time when the digestion of fat begins.

When the assimilation of fat is defective, as it is apt to be in persons of the strumous diathesis, or the tubercular cachexia, it may be necessary to furnish artificial aid to the pancreas. The secretion of the pancreas acts upon starch, dissolves albuminoids, and emulsifies fat—in an alkaline medium. The acidity of the stomach is largely exhausted by the digestive act; and, normally, when the chyme passes through the pyloric ring, it is easily rendered alkaline by the bile; and in the alkaline medium the pancreatic diastase is operative and so is the trypsin,—which digests albuminoids in an alkaline medium. When the gastric acidity is not effectually neutralized by the bile, not only does the patient suffer from duodenal dyspepsia, but the action of the pancreatic secretion is thwarted. When we wish to aid pancreatic digestion, we must bear in mind that an alkaline medium is essential to success. We must wait till the stomach is but feebly acid, and introduce the artificial pancreatic secretion under an alkaline guard. The least objectionable article is a cupful of milk, to which a quantity of prepared chalk or calcined magnesium has been added. To this a pancreatic preparation is added, and all stirred up and swallowed. A dose of fat as an emulsion, or as cod-liver oil, may be taken just before this, or the milk vehicle may be milk in which mutton suet has been boiled. Combined, the matters pass safely through the stomach, and aid the pancreatic digestion in the upper bowels.

This is but a somewhat brief sketch of the subject; but if the reader master it thoroughly, he will be able to feed (and so

to save) many a patient at critical times, or when the digestive organs are upset—a matter not unfrequent in the course of some maladies. In pulmonary phthisis such upset of the assimilation is quite common; and however much we may wish to push on the tonic treatment, we have to make a complete change of front and meet the gastric symptoms. The tonic must be withdrawn, and a mixture of bismuth and soda, as the following mixture, substituted for it:—

Bismuth Trisnit. gr. v.
Sodæ Bicarb. gr. v.
Mist. Acaciæ, ℥i.
Inf. Calumbæ, ℨi., ter in die,

and the dietary insisted upon in the early part of this chapter must be adopted. When the gastric irritability has passed away, the ordinary dietary may be resumed.

As an addition to ordinary meals, it is often well to give a small meal in the intervals. For such purpose meat-broth, with baked flour, or a prepared food, may be given; or milk with a malted preparation. Anything indeed which is really digested. These are often requisite with those who can only digest a little food at once, and therefore require something at short intervals.

It is most important that the patient should not tire of his dietary and lose his appetite. Any nurse who has even an elementary knowledge of cookery will by a little tact and ingenuity manage to ring the changes, and introduce an appearance of novelty, by the judicious combination of flavouring agents. Mrs. de Salis gives the following directions for the preparation of aspic jelly:—

Aspic Jelly.—Take a calf's foot and chop it into eight pieces, and put them into cold water and wash them well. After that, put them into a stewpan with sufficient water to cover them, and let boil; as soon as the water boils, take the pieces of calf's foot out and wash them again in cold water. Then put them back into the stewpan with a pound of knuckle of veal, which must be cut into small pieces. Pour three-quarters of a pint of water on these, and bring it to the boil; skim it

carefully. Now add a little salt, fifteen peppercorns, half a clove of garlic, one shalot, one sprig of thyme, and a sprig of parsley, one onion, and half a head of celery, one carrot, and a turnip—of course all these must be peeled and washed—add also two sprigs of tarragon, one chervil, and a bay leaf. Let all boil gently for five hours, then strain off liquor through a sieve into a basin. When it becomes perfectly cold, skim off all fat with a spoon. Take a clean cloth, wring it out with hot water, and rub it lightly over the jelly stock, and then take a dry cloth to dry it. Peel a lemon very thinly and put it into the stewpan; squeeze the juice out through a strainer, and whip the whites of two eggs to a slight froth. Put these and the egg-shells into the stewpan with the stock, one glass of sherry, and a dessert-spoonful of Chili vinegar. Whisk this all together till it boils. Then take a spoon and skim it carefully, and let the stewpan stand by the side of the fire for half-an-hour to form a crust. Then take a clean jelly-bag; make it hot, and strain the stock through it. If not clear the first time, strain it a second time.

This may be used as the basis for many useful dishes, such as the following:—

Aspic of Fillets of Chicken (*Filets de Volaille en Aspic*).—Take the mould, and pour in a little aspic jelly to the depth of a quarter of an inch. When this is set, cut some shapes of hard-boiled eggs, truffles, gherkins, and beetroot; arrange these in patterns round the mould; pour in some nearly liquid aspic jelly gently, and put it on the ice to freeze. Arrange fillets of chicken, previously cooked, skinned, and cut in a good shape, neatly all round. Pour in as much more of the aspic as will set the chicken, then put round and over the chicken some mayonnaise, and over this more cold aspic. Fill up the mould with liquid aspic, and put it to freeze. Turn out, and serve with whisked aspic and endive as a garnish round it.

As convalescence progresses and the patient is gradually restored to health, the following recipes will be found useful:—

Crème de Volaille.—To a quart of strong chicken broth add a gill of cream and three large tablespoonfuls of gries, a preparation obtainable at any German delicatessen shop. Stir slowly over a slack fire till the gries is thoroughly cooked, then strain

through a hair sieve, return to saucepan for five minutes, and serve with button mushrooms fried in butter, drained till perfectly dry, and kept hot on a plate in the oven till needed.

Poulet au Riz.—Take a chicken trussed for boiling and put it into a stewpan, with half a pound of parboiled rice, a few peppercorns and a little salt, enough water to well cover the fowl and rice. Let it simmer gently over a slow fire for three-quarters of an hour. When cooked remove to a hot dish; add to the rice pepper, salt, a gill of cream, a little nutmeg, and half an ounce of butter. Make this mixture very hot, stirring gently the while, for five or six minutes; garnish neatly round the fowl, and serve immediately.

A useful addition to the last recipe is the following:—

Potatoes à la Crème.—Cut some boiled new potatoes into slices, put them in a stewpan with half a pint of good white sauce, half a gill of cream, pepper and salt, and a blade of mace; simmer for fifteen minutes, and serve hot.

To make a *Cream of chicken* pound the breast in a mortar, pass through a wire sieve, put into a mould with three tablespoonfuls of cream and the yolk of an egg; season well, and steam for twenty minutes. It should be served with sweet red capsicums.

Chicken breasts should be stewed with a little butter in their own juice and served with small fresh grilled mushrooms. Preserved mushrooms should not be used, as they are hard and indigestible.

CHAPTER XXV

THE MANAGEMENT OF CONVALESCENCE

§ 248. The management of convalescence and of the convalescent is of very great importance, for patients are often wrecked after the storm is over, and the way to port seems safe and clear. For example, patients with mitral regurgitation, instead of following the directions laid down for them under medical advice, too often insist on disregarding their doctor's injunctions, and fall down dead as a result of injudicious exertion. Gouty patients not uncommonly get tired of a restricted dietary and resume their old habits of dining well, and taking stimulants too freely, with disastrous results. The same applies even more forcibly to the victims of diabetes. Sufferers from angina pectoris become so inured to the use of nitroglycerine, and become so confident in its curative effects, that in time they overstep the bounds of prudence and revert to treatment when it is too late to be of much benefit. When the patient is on the fair road to recovery after a long illness—an attack of enteric fever for example—attention will have to be paid to a number of details, such as change of air, change of scene, change of companionship, improved dietetic arrangements, exercise and possibly stimulation of the excretory organs. The selection of an appropriate health-resort often presents many difficulties. The choice of a suitable place will be guided by a variety of considerations. Distance from home, and facilities for travel, must be taken into consideration. It is of no use attempting to send a man on a long Continental journey who has only just left his bed. The Riviera may be all very well in its way, but a journey which shakes one to pieces is not to be undertaken

lightly. Even if the journey is broken, it involves much expense and the necessity for passing one or more nights in strange hotels, and sleeping in strange beds, and under circumstances of considerable discomfort. Time of the year has to be taken into consideration, and above all the means of the patient, or, what is pretty much the same thing, of his relatives or friends. It is of no use suggesting a plan which turns out on investigation to be impracticable. In the case of an invalid who wants to get out of London, a couple of hours will bring him to many places on the south coast, and in the winter he cannot do better than select St. Leonards or Ventnor. In the summer he has a much wider selection on the east coast, and will probably feel tempted to try the bracing air of Cromer or Yarmouth. When the patient is able to get out for more than an hour or two at a time, "rooms" will usually be found more convenient than an hotel, although in the "dead season" hotel proprietors are commonly accommodating enough. The patient may possibly be sufficiently strong to undertake a sea-voyage, and may derive benefit from a trip to Gibraltar to Madeira, or even to the Cape. The accommodation is ample, and the different steamship companies readily supply all particulars. Sun is an important element in building up health, and rooms with a southern aspect present many advantages. A very important matter is the facility for obtaining a varied supply of food. In many country places fish is at a premium, and the butcher kills only once a week. Good cooking is of the utmost importance, for no matter how good the food may be, it is useless if not properly prepared. The patient should take with him a selection of readable literature, although the best of all books is a bright and cheerful companion, in the case of a man preferably of the female sex. If no relative is at hand who will fulfil this useful function, a "nurse" can readily be obtained who will leave nothing to be desired. With regard to medicines, resort will probably be had to quinine and strychnine, the hypophosphites, and possibly cod-liver oil or extract of malt. Attention must be paid to the condition of the bowels, and although active purgation may not be necessary, a gentle laxative is usually called for from time to time. The patient must be encouraged to shake off his invalid habits, and to look forwards

rather than backwards. To use a favourite Irish expression, he should "cast a retrospective glance into the future." If he is capable of accomplishing this, his convalescence is secured.

Patients during convalescence often suffer from extreme thirst. There are various kinds of syrups which, when added to soda water, Vichy water, Vals water, and other effervescing waters, previously iced, produce agreeable summer drinks, much appreciated by the parched and thirsty convalescents from fevers and other acute illnesses. The proportion of syrup added to the effervescing water is a matter of taste, but should not exceed a teaspoonful to the tumblerful. Simple syrup is made with a pound of white sugar, a pint of water, and ten grains of isinglass. The water must be warmed sufficiently to dissolve the sugar, and the isinglass must be dissolved separately in hot water. The isinglass is then added to the syrup, which when cooled should be strained. Raspberry, blackberry, or strawberry syrup may be made with half a pint of the syrup of the fruit, one pound of sugar, and a drachm of citric acid. The citric acid is dissolved in the juice, and boiled with the sugar until no scum arises. It should be skimmed carefully, and bottled when hot. An excellent syrup is made by mixing five parts of vanilla syrup, one part of pine-apple syrup, and two parts of strawberry, lemon, or raspberry syrup. "Orgeat" is a simple, unpretentious drink, and may be made as follows:— Blanch two ounces of sweet almonds and four bitter almond seeds. Pound with a little orange-flower water into a paste, and rub this with a pint of milk diluted with a pint of water until it forms an emulsion. Strain, and sweeten with sugar. This is recommended as a demulcent and nutritive liquid.

§ 249. When a patient is convalescing from acute disease, or is emerging from a state of mal-nutrition on a liberal dietary, it is not uncommon for him, or her, to become "bilious." The assimilative capacity is such that the liver is loaded with waste nitrogenized matters. The tongue is coated with a yellow fur (stained with the colouring matter of bile, which is never far away from bile-acids, and bears the same relation to them that the rattle of the rattlesnake does to its fangs), there is a bad taste in the mouth on awaking in the morning, with loss of appetite. The liver has more in hand than it can deal with,

and so puts the appetite into abeyance. The patient wants to get on with the food-taking, and applies for something to improve the appetite. The inexperienced practitioner prescribes a bitter, perhaps with iron, forgetting to inspect the tongue. The patient feels no better, but is now in addition troubled with thirst. Getting no better, he consults a man of greater experience, who at once prescribes a mercurial pill—

Calomel, gr. ii.
Pil. Coloc. Co. gr. ii.

at bed-time, and a black draught, or a Seidlitz powder, or some mineral water, or Carlsbad salts, or citrate of magnesia, next morning. The patient is at once relieved, the bad taste in the mouth disappears, the tongue cleans, and the appetite returns. At other times the results are not so striking, and a second pill and morning draught are required to put matters right. When a patient is put upon a milk and malt dietary, not uncommonly a "bilious" condition is set up; for is not milk known to be "bilious"? To remedy this it is usually enough to keep the bowels open by a laxative pill; but at times the mercurial pill and the morning draught become indispensable.

Reference has been made to the pyrexia which follows a "surfeit." In the convalescence of children from acute maladies the appetite is usually brisk, and food is willingly given and taken in practically unlimited quantities; then the liver becomes overcharged. The albuminous bodies (containing nitrogen) do not readily oxidize; while the hydro-carbons readily burn. The nitrogenized waste in the liver may be termed the "ashes" of the body, *i. e.* the incombustible part of our food. A sharp pyrexia follows, often very sharp. Of course the modern medical man immediately thinks of something to lower the temperature, and gives a combination of quinine and aconite or other antipyretic; but the results are not satisfactory. The effect of high temperature upon the albuminous tissues is to melt down the tissues. Now in the pyrexia of a surfeit, Nature is setting up a "bonfire" to burn up the unoxidizable nitrogenized waste; is indeed doing the one thing by which this waste can be got rid of. Is it well to thwart the process by the administration of antipyretics? Probably not; the old-fashioned plan of giving

Calomel (gr. iii.) and Jalap powder (℈ss.) to unload the liver, is decidedly at once more rational,—and what is more, is more successful.

The readiness with which calomel gives relief in such a condition led to its abuse in past times; the consequences of which were such, that a widespread distrust of the drug took the place of the previous over-reliance upon it. In other words, the swing of the pendulum was seen; and now there is an extensive objection to make use of the drug; which is in reality as valuable as ever when properly used. It is not well, however, to have habitual resort to it; but a little occasionally is of priceless value.

Linked with this subject is that of the management of the maladies of advanced life, when the kidneys are not in their integrity. A large number of the maladies of persons advanced in years (as the different manifestations of gout for instance) are linked with liver-perversion or renal inadequacy, or in other words, with the presence of nitrogenized waste in excess in the blood. In the convalescence in such cases the greatest care is requisite to avoid overrunning the capacities of the liver and kidneys. The diet must be spare, and consequently the convalescence slow—slower than need be, the patient thinks, or perhaps his friends do for him. It is a by no means rare occurrence to find an elderly person convalescing from some such malady doing well, but "getting on slowly." The time arrives for a change to the sea-side; and a new medical man comes on the scene who perhaps has no very definitely-formed opinions about accumulations of nitrogenized waste in the blood, and when asked about a more liberal dietary readily gives his consent thereto. For a brief time all goes well, but disaster comes sooner or later. An aneurysm may be set up, or a fit of apoplexy, or of angina, or of palpitation, or even acute dilatation of the left ventricle may set in—all alike the outcomes of a high arterial tension. The only way to avoid such distressing accidents (if "accident" can apply to what might be avoided), is to remember the relations of nitrogenized waste in the blood to the blood pressure in the arteries; and the maladies which are linked therewith.

§ 250. Then again there is the matter of exposure to cold in taking exercise, or perhaps rather in taking an airing. The

patient forgets that for some time past he, or perhaps rather she, has been in bed, which is a very cosy place, or in a bedroom or other room with a good fire, *i. e.* has been living in a high temperature, and so is abnormally susceptible to cold. Ordinary precautions are taken doubtless; but ordinary precautions are not sufficient in the present instance, and a chill is taken. It may not be more than a nasal catarrh, but it may mean inflammation of the lungs and bronchitis, and be severe enough to threaten life seriously. The tale, "I was doing well, but I got a chill, which threw me back terribly," is a very common one. It can only be avoided by prudence on the part of the individual, a proper clothing according as the day is warm or cold; whether the air is still or it is windy; whether the patient propose to walk or drive. Then sometimes in this fickle climate of Great Britain the weather quickly changes, and the clothing fit enough when going out is insufficient for getting home with safety. Or a locality is treacherous, as is Hastings, for instance. While a west wind is blowing all is right; but in an east wind it is very different. A person is quite warm in a street or square sheltered from the east, but steps out suddenly, when the east wind sweeping round the Castle Hill catches him; and, before he is aware of it, has fastened a chill upon him. Indeed the more sheltered a place is, the greater is the risk of getting such a chill unless the greatest care be taken.

In the same way an indiscretion in eating will bring on indigestion in convalescence, and sorely impedes the progress of the case. The appetite is keen, and the assimilation good, and "nothing comes amiss," till a veal-pie or a pork-chop is ventured upon; and then the deed is done, and the stomach upset. In such cases Nature protects the patient by nausea and vomiting until the digestive organs have recovered from the blow, and slowly regain their power. Here two lines of conduct are open for selection. The one is to send the patient to bed (to minimize the body expenditure), and to put the patient rigidly on a limited dietary, and so allow the weakened or stunned organs to recover their tone speedily, or to recommend the patient to be careful about his food, without any particular stringency, and permit him to sit up. The latter is perhaps the more acceptable to the patient, but the former is the better. Or some food

irritates the bowel, and diarrhœa is set up. The unthinking practitioner prescribes chalk and opium, thwarting Nature's operation, and prolonging the diarrhœa. Or perhaps even arresting it, and detaining the offending matter in the alimentary canal, till enteritis is the consequence. The first matter obviously is to see that the bowel is thoroughly cleared out and freed from its irritant contents. The old plan of a dose of rhubarb (which first purges and then locks up the bowel) is a good one to adopt in such case.

These disturbances of the alimentary canal are of infinite importance in practice. However much we may wish to push on any line of treatment, say a tonic and cod-liver oil in phthisis, when there is acute disturbance in the digestive organs it must be suspended; and a change of front in the treatment must be made to meet a change of front in the patient's condition. Sickness or diarrhœa is set up, or the liver is upset, with a brown tongue, and then the line of treatment has to be changed, until such time as it becomes possible to return to the tonic line, *i. e.* the treatment of the general condition. Or the cod-liver disagrees, and must be withheld—perhaps altogether, certainly for a time. All risks of upsetting the digestive organs must be avoided, whenever it becomes desirable to feed up a patient; else a "back cast" is readily induced.

All this is familiar to the man of experience, but how is that experience gained? By bitter lessons! And if it were only possible to transfer the experience stamped upon the brain of one man to another's brain, how much trouble might be spared; how many illnesses avoided; how many burning memories escaped! It is impossible to always avoid "accidents"; but it is as well to try our hardest to do so: and when they do occur, to learn a lesson from them, and to be each of us "a sadder and a wiser man."

One accident sadly too common is the upsetting of the liver by continuing a course of iron without inspecting the tongue at regular intervals.

The proper management of convalescence is a matter of experience. Still this chapter may help the reader to profit by his own experience, and to put his thoughts together in an orderly manner.

CHAPTER XXVI

CONCLUSION—THE MEDICAL MAN AT THE BEDSIDE

§ 251. In this concluding chapter may be found a fitting place for some remarks intended chiefly for junior readers. The first matter to be attended to in practice is a proper demeanour. Whatever may be the ordinary manner of a medical man, a certain carriage in the sick-room and at the bedside is ever desirable. Such carriage is looked for by the patient and his friends, and a sense of disappointment will be felt if it be wanting. The medical man should avoid, so far as may be, attracting the attention of those around him to himself, instead of to what he has to say. The conduct and behaviour of the medical attendant will also exercise much influence in inspiring the patient with confidence, and so encouraging him to follow the directions given; and thus to give the advice and plan of treatment a fair trial. The young practitioner must remember that he is the subject of a keen and critical survey, and his manner should be calm and self-possessed. Nothing will enable him so well to sustain the critical examination, and endow him with composure under the ordeal, as confidence in his own knowledge of his profession—in its social as well as its higher and more important aspects.

There are also some social points to be attended to, and the following remarks by Prof. Austin Flint are so appropriate and so aptly phrased, that they are reproduced verbatim:—

"Cheerfulness of mien is an important element in clinical medicine. It is not merely a politic accomplishment; it is a professional duty. Its moral influence upon patients entitles it to rank among the measures of treatment. In its cultiva-

tion, hilarity and frivolity are to be avoided. The latter, in the intercourse between the physician and patient, are unprofessional.

"It is a duty to manifest a proper degree of interest and sympathy in cases of disease. This not only wins the confidence and attachment of patients, but an influence is thereby secured which, judiciously managed, may be made useful in the treatment. Discrimination in this regard among patients, according to their station in life and their ability to remunerate for medical services, brings justly a reproach on the character of the profession. Manifestations of indifference or harshness towards patients in charitable institutions deserve to be stigmatized as brutal. These patients have claims of poverty added to those arising from their diseases. Moreover, inasmuch as they are involuntary patients, that is, having no voice in selecting and retaining those to whom they look for relief, inhumanity towards them is taking an ignoble advantage. Brutality is less reprehensible when manifested toward those whose influence is valuable, from whom fees are expected, and who can terminate at any moment professional relations with their medical advisers.

"Patients are entitled to all the encouragement which can conscientiously be given. In this point of view there is a marked contrast in the conduct of different physicians. Some who are unfortunately disposed to look upon the darkest side, anticipating the most unfavourable events which can happen, communicate their apprehensions and gloomy forebodings either by word or manner. This discouraging influence on the minds of patients is often baneful. It is a duty to give the encouraging points in any case, and it is a duty not to discourage by presenting prospective dangers which are problematical. Cases which furnish an exception to the latter rule are those in which it may be necessary to alarm the patient in order to secure measures of protection against events which are liable to occur. For example, the effect of phthisis on the mind is such that patients sometimes insist upon the inutility of taking any steps to prevent the further progress of the disease. As a rule, whenever there is any doubt as to the degree of existing danger, patients should have the benefit of the doubt in the way of encouragement.

"In cases of disease threatening life, shall this fact be voluntarily communicated to patients in order to give time for the disposition of worldly affairs and other preparations for death? With reference to this question, the physician is often placed in a delicate and somewhat difficult position. It is rare for patients with mental faculties intact to ask, of their own accord, a direct question as to immediate danger. If asked, the physician is bound to answer without deception, but, if possible, with qualifications which will not take away all hope. If not asked, it may be the duty of the physician to suggest that some friend of the patient communicate the fact of imminent danger. Patients after becoming aware of danger, and having made, in view thereof, every preparation, are sometimes more tranquil than before. Resignation at the near approach of death is the rule; fear and dread of the termination of life, when encouragement can no longer be given, are exceptions to the rule. This does not militate against the beneficial influence of encouragement so long as it can be given. In brief, knowledge of the character of the patient, and of all the circumstances in individual cases, in connection with the exercise of judgment and tact, must determine the conduct of the physician when diseases approach a fatal termination. It may be added that the visits of judicious clergymen are unobjectionable either in the cases now referred to, or when life is not immediately threatened.

"Physicians are most apt to be asked respecting danger when patients either imagine its existence, or suppose that it does not exist. The usual mode of asking is not, 'Tell me candidly if I am in danger,' or 'What are the chances of my recovery?' but 'You do not think my case serious?' or 'You have no doubt of my recovery?' Most patients who infer from circumstances that they are considered to be in great danger, prefer not to be told so in plain terms. If there be danger, not proximate, but more or less remote, the answer to the foregoing questions should be such as to avoid deception, to secure any needed preparations, and, at the same time, not to withhold a proper degree of encouragement. 'It is better to be prepared and not go, than to go unprepared,' was the happy reply of a medical friend of the author to a patient who inquired whether

his condition was sufficiently serious for a final disposition of affairs.

"Intimations to patients of a liability to sudden death should be made with the greatest reserve. The cases are rare in which the physician is able to foresee this event with anything like certainty; and it is a cruel act to intimate the liability on insufficient ground. The author has known repeated instances of wretchedness for years caused by the belief that apoplexy might be expected at any time; and that death might occur at any moment in cases of purely functional disorder of the heart. Even in cases in which a liability can be recognized, as in cases of angina pectoris, fatty heart, and certain aortic lesions, the event may not occur for a long period, if the patient do not die of some intercurrent affection. In these cases, the physician should inform some discreet friend of the patient of the recognized liability to sudden death. It is well, also, to make memoranda, which may be referred to after sudden death has occurred, as a protection against the charge of either negligence or ignorance.

"Communications in respect to danger may often be made to relative or intimate friends with less reserve than to patients. They are, however, to be made with discretion. If extremely discouraging they are apt to be interpreted as taking away all hope. The patient is considered as 'given up.' The effect is demoralizing. Either further efforts are abandoned, or doubts arise concerning the propriety of the practice pursued; both telling against the welfare of the patient. The physician should bear in mind that in certain cases he may over-estimate the danger, and that instances are not very infrequent of recovery when the condition seemed as hopeless as possible. All physicians of much experience can cite cures illustrative of this fact.

"Undertaking to predict that a patient will live a certain number of days, weeks, months, or years, is injudicious to say the least. It is a hazardous undertaking as regards the sagacity of the physician, and it may occasion mischief. Giving the percentage of the chances of death or recovery is also objectionable. It does not confer credit on the profession for healthy persons to be able to say that in years past they were pronounced incurable, and the time of death specified.

"It should be a rule of professional conduct not to communicate information concerning the maladies of patients, except to those entitled to receive it. Patients have a right to the privacy of their diseases, albeit it is but little respected by individuals or the public. The question so often addressed to physicians, 'What is the matter with this or that patient?' is asked in innocence of its impropriety, and therefore does not challenge rebuke; but pains should be taken to have it generally understood that such question is improper, and that the physician is not at liberty to answer it, unless authorized by the patient.

"Certain rules relating to professional visits may be mentioned. The frequency of visits, aside from the wishes of patients and friends, is to be regulated by the importance of observing variations of symptoms, or the effects of treatment; and of this, of course, the physician is the best judge. The liability to err in the number of visits is in making too few, rather than too many, for the reason that physicians are generally sensitive in regard to an imputation of making more visits than are required. This sensitiveness, carried to an excess, not infrequently is of damage to the physician, patients inferring lack of interest or attention. Too short intervals between visits are sometimes objectionable, leading to injudicious changes in treatment. In general it is not advisable to remain constantly with patients unless for the purpose of carrying out measures of treatment which require continued supervision. Regular visits should not be so brief that full attention cannot be given to the case, and the physician should not appear to be hurried. The patient is apt to be left in an uncomfortable frame of mind if there be occasion to think that the case has not been well considered. On the other hand, visits should not be too prolonged. After examining, prescribing, and giving full directions, the sooner the physician takes his departure the better, if there be no special reasons for delay. During a professional visit the first and chief topics of conversation should have reference to the case. It is a great mistake to act as if the latter were of secondary consideration, the greater part of the time being devoted to extraneous matters. Physicians sometimes fall into the error of occupying

the time with a recital of other cases, and telling of matters exclusively concerning themselves. These rules of conduct are important with reference to professional success as well as to the welfare of patients.

"The manners and appearance of the practitioner of medicine are by no means of so little moment as to be unworthy of being alluded to in connection with clinical medicine. In no profession or calling are coarseness, vulgarity, untidiness, and repulsive habits more incongruous than in medical practice. These comprehensive terms will suffice without going into details. The physician should be ready to overlook the waywardness, ill-humour, and prejudices of those to whom he is called upon to minister in disease. He should not be oversensitive as regards personal dignity, and as far as possible, he should refrain from exhibitions of irritability of temper. Sickness claims forbearance and charity. Still there are limits to endurance and encroachments on self-respect. If a patient, whose intellect is unaffected by disease, refuse to follow the treatment which the practitioner decides to pursue, he should at once decline any further responsibility in the case; and if there be other manifestations of want of confidence the case should be relinquished."

Sometimes the relations between the practitioner and patient become seriously strained, and then a consultation is imperatively demanded to protect the practitioner and to allay the mind of the patient. To decline a consultation is often to arouse the suspicions of the patient that the medical attendant is not so confident in his diagnosis and measures of treatment as he would like to have believed; and the practitioner should bear this in mind as soon as there arises any tension in the relations betwixt him and his patient. If the consultant agree with him, then the patient is satisfied; if the ordinary attendant has failed to grasp the case in its entirety, or to appraise correctly some new symptom, then the patient gets the benefit of the consultation.

Bearing all the above in mind, and having been shown into the sick-room, it is very desirable for the medical attendant to take up a position where his own face and features shall be placed in the shade; while the light shall fall fully upon the

countenance of the patient. By this means various important ends are secured. In the shade, and so comparatively veiled from observation, the facial muscles of expression may not betray what is passing through the mind; for such expression might readily do much ill-service. At the same time the light upon the patient's features will often reveal a wavering eye, a tremulous lip, a quivering nostril, or the frown of pain, especially when showing itself in brief intermittent twitches; or it will bring out the configuration of the teeth, the contour of the face, a tortuous temporal artery, or a dendritic atheromatous arterial twig; or perhaps a fatty cornea and an arcus senilis; all of which furnish valuable indications to the eye which has not only learned to note them, but also can interpret their significance correctly. All this may be observed while examining the tongue. Carefully-cultivated physiognomical diagnosis, as taught by Prof. Laycock in Edinburgh, will often give most important hints, directing the verbal inquiries, and pointing to the necessity for certain physical investigations; and, perhaps, more than all, often furnishing valuable suggestions as to the line of treatment to be adopted.

As to the questions put, they should be brief, and incisive rather than discursive; especially if the case is a grave one. They should always be to the point. If much talking has to be done, let it be done by the patient or his friends. See all about your patient; and do not divert the attention of those around from the matter in hand to the observation of yourself, if you are either prudent or careful about producing impressions and gaining confidences. A good knowledge of practical psychology is invaluable: still it can scarcely show to advantage if unaccompanied by a fair knowledge of your profession.

Spare no pains over your patient: and carry yourself so that you produce the right and correct impression that you are taking pains, and not merely being fussy. Shallow and ignorant people are especially apt to misinterpret great pains. Be on your guard, then, with such persons, or rather, perhaps, against them. With such persons it is never safe to be demonstrative. It will often be necessary to be reserved in self-defence. It is a good test of the natural good sense, as well as of the perfection of training in the observing faculties of a young medical man,

to be able to distinguish betwixt the sensible and intelligent persons to whom he may be advantageously communicative, and the opposite order of individuals in whose case silence is indeed golden.

§ 252. While this scrutiny is going on, inquiries may be made as to the family history, especially if there be any tendency to certain diseases or special peculiarities, as affections of the nervous system, chest diseases, &c. It is a matter of the greatest importance to form a sound and clear conception of the diathesis, as manifested by the class of ailments to which the family is liable. By such means only can be acquired that information which is called "a knowledge of the constitution"—a matter highly prized as well as of real value. Having gathered what can be gleaned on these topics, it is necessary to go carefully, yet warily, over the patient's past history. In doing so the discretion will often be severely tested. Really curious facts do occur in the histories of the lives of patients, which should not be overlooked, or always listened to in a spirit of incredulity. To act so would often be far from prudent: and I trust sincerely that every reader, no matter how little advanced in his studies, will be conscious how important a matter it is for a medical man to be prudent. At the same time, facts sometimes array themselves in such order that certain conclusions are forced upon one, and are irresistible; however the patient may wish to arrange them to tell something else. For instance, if a slim woman of good physique, and naturally good constitution, married, and who has had several miscarriages, complains of rheumatic pains in the collar-bones, upper arms, and lower parts of the legs, it is well to listen with mute and unmoved countenance to her story of getting wet on going to church, and having to sit in her damp clothes through the service, which is probably all true enough; or another will tell of having to work in a laundry: but all the time we are conscious that syphilis is at the root of it all, and see in mercury and iodide of potassium the best cure for such rheumatic pains. In fact it is necessary to apply one's experience without annoying the patient.

It is well also to mentally appraise the intellectual powers of the patient and those around, and estimate their intelli-

gence carefully. Also try and test them as to how far they are likely to obey instructions to the letter, or to neglect them. If the latter is to be apprehended, the directions should be brief, to the point, and given with decision. If the patient or his friends are familiar with sickness, the medical man may fairly venture to be more explicit. But it must be remembered this very experience makes them more capable of estimating him in turn. Avoid familiarity under all circumstances. Be courteous, interested, and sympathizing: but be on your guard against possible misinterpretation.

§ 253. Having gathered together a fair series of facts as to the past, concentrate the intelligence upon the immediate subject-matter in hand. Listen to the patient's account of the origin of the ailment, throwing in a well-directed question from time to time. Go carefully over every organ and system *seriatim*. Get into the habit and practice of making a systematic examination. If a woman, after asking about her bowels, inquire about her reproductive system. But, remember, ask about it in the same strictly business tone. If you hesitate, as if the inquiry were one of doubtful propriety, your patient will feel some hesitation in answering it; and the position will be disagreeable and unpleasant for both. This is a matter of much moment. If the patient is a spinster in the upper classes, it is the proper thing to make these inquiries of her mother, or of her maid, nurse, or other attendant. Never omit that. Having made a careful examination, including a close and painstaking physical examination, you will be then in a position to arrange the material into a diagnosis consistent with the facts: this will suggest the prognosis, and give a direction to the treatment. Be cautious, and do not commit yourself rashly to a prognosis. Often this is the result of your being consulted; and your opinion is asked as to the nature of the ailment with much *empressement* by those who really do not care about it. They are eagerly noting the answer, as furnishing to them some guidance in the formation of their estimate of the value of your answer to their next question. If you do not succeed in impressing them that you quite understand the case, they naturally come to the logical conclusion that your answer to their next inquiry will not be very trustworthy. If your

answers as to the nature of the case are satisfactory, then they feel confidence as to the value of your next answer. If neither answer inspire confidence, the mutual relations will not be very agreeable.

It is always a good plan to make a note as to what you have said to the patient or the friends. It is unfortunate if at the second visit you contradict what was said on the first; or give conflicting directions without some explanatory statement. If this should be done, and the medical man is reminded that he said so and so on a prior occasion, a truthful answer will best serve him. Say at once, "If I said so then, there must have been some reason for it, else I should not have said it." Try to remember, and get your informant to aid you in your effort. But do not leave the matter uncleared up and in doubt; make it straight by all means.

The medical man is also often told that some professional brother has given an opinion different from or opposed to his. This is an unpleasant matter. If the people had been quite satisfied with this other opinion they would not have sought a second. Know all the circumstances. If there be a change of residence, or death, or sickness on the other medical man's part, to account for the change, then all may be fair and above-board. If the matter looks at all "doubtful," be very cautious. It is not given to all members of every family to be able to turn everything over exactly as they get it; indeed such power is very rare. They may not have heard correctly, nor understood the previous attendant thoroughly. They may even wish to extract from you some expression of opinion, which is contradictory to his, in order to make mischief. The natural opinion of every young practitioner is that the patients who call him in are of a high order of intelligence, and indeed generally superior to those who do not so act; and he is inclined to trust them accordingly.

This is very natural; but it is too often an amiable delusion. They may be impelled by sheer curiosity to draw you out and lead you into some expression of opinion. Or they may wish to extract from you what they wish to hear. It is a marked feature in patients, the youthful reader will find, that they always most readily accept and believe what they wish to

believe. Culpable suppression of certain symptoms is not unknown in order to induce an opinion favourable to their inclinations. For instance do not be tempted to stake your reputation on the integrity of the kidneys because one hasty boiling has not furnished traces of albumin. Especially if some one else had said that they were affected. Passing periods of total absence of albumin are not at all rare. Be prudent and careful that you are not converted into a means of annoyance to a brother practitioner. The people who would behave so to another, will not hesitate to turn round and serve you a similar ill-turn if necessary. Confine yourself as strictly as possible to the matter in hand: and be cautious about making any statements or admissions that may be troublesome or disagreeable on some future occasion.

Always remember that you have to sustain the reputation of your profession, as well as your own. The reputation of the profession is the aggregate of the individual reputations of its members.

Dr. I. N. Love, of St Louis, the editor of the *Medical Mirror*, believes that the best speciality for a young medical man is that of general practice. He points out that it develops him in every way—broadens his sympathies, widens his general culture, increases his knowledge of human nature, improves his powers of diagnosis, and makes him a useful member of society. He says—"All honour to the general practitioner, honest, unremitting in his service to suffering humanity, often poorly paid, for his sympathies are constantly drawn upon, dealing as he is with the gravest responsibilities of life and death, from the cradle to the grave." His advice to medical men engaged in general practice is well worth quoting:—

"As you advance, make it your habit, in a careful and discriminating way, to be paid for your services where it can be done. Later on, you are justified in declining your aid to those who are able to pay and will not. Systematic care will soon enable you to weed out the unworthy and unappreciative. As you grow older in your profession, resolve to develop some special skill. Your taste will materialize and you will know in what particular direction you may be considered an expert, and now begin to weed your practice. Get rid of your ambi-

tion to have the largest visiting-list in the community. Do less work and better work. Pursuing this course, you need not, as many do in the profession, grow old ungracefully, and, with hat in hand, anxiously seek patients and make frantic efforts to hold those which you have had but who are now disposed to go elsewhere. Remember that this is the age for the young man. More and more the world wants activity, drive, alertness, energy, and will have it, and with the progress of years, undoubtedly this tendency will increase, and it behoves every one of you to realize that the time for you to do your best work is before you are sixty."

Another thing to bear in mind, is to avoid unnecessary fuss or superfluous measures, until you are in a position to do so with immunity—and usually only very fashionable physicians are in that position. There are wealthy *nouveaux riches* who adore fuss; and it may be well enough in their case. But the majority of human beings do not. So just adapt the measures to the necessities of the case. Often the simpler and less complex the measures, the greater and more distinct the impression produced. For instance, if a patient comes with a persisting diarrhœa, which has resisted the different measures tried, and it is obvious that it is due to irritant material in the bowels, a full dose of castor oil, or still better of rhubarb powder, will at once end the matter. Here the very simplicity of the remedial measures will gain the prescriber credit.

§ 254. Wherever you are, and under whatever circumstances you are placed, never forget two things:—1. Your own self-respect; and 2. The honour of your profession. The first is your duty to yourself; the second is your duty to your neighbour. First, see that you conduct yourself so as to ensure the respect of those with whom you are thrown in contact. Secondly, never speak of, or behave to, a professional brother so as to bring him into discredit. This last is very important. The want of it has done much harm, and prevented us, as a body, from taking the position which would otherwise have long since been accorded us. Each ecclesiastic asserts the dignity of his office, however unworthy he may think some others are to fill it. It would be wise if we followed their

example—in this respect at least. Another lesson, too, we might learn from them, and that is the air of respectful gravity they assume at once when speaking of matters theological; and the readiness with which they check any levity of speech on such matters on the part of any one present. We all know how cautiously such subjects are spoken of in the presence of ecclesiastics. What a contrast the hushed, reverential tones of the laity discoursing of matters theological before a minister form to the readiness with which even well-bred people rush into flippant observations about homœopathy, hydropathy, and chloral hydrate, or electricity, to medical men; in season and out of it. In fact some people would seem never to allow a medical man any social distraction from incessant tales of bygone maladies. No doubt to some extent such conversation is unwittingly encouraged by a medical man's pride in his profession. It is rare to find medical men voting the subject of their daily thought and their lives' energies "shop." They know better than that; and are apt to be drawn into medical talk in order to correct wrong impressions, or relieve a misapprehension. Consequently there is a large class on the watch for informal consultations. And there is a larger class who follow their example in talking medicine to medical men; not from any mean ulterior motive, but simply because they do not know any better. They mistake courteous attention for a professional interest in their conversation.

It is quite time that we followed the example of the other professions, theology and the law. The one in making professional subjects matter for respectful speech: the other in not being led into informal consultations. Thorough self-respect and perfect self-restraint are expected from you. It is but your duty. There is no credit attached to the mere discharge of duty.

In approaching sick persons, it is well to blend cheeriness with sympathy. The visit of the medical man should be looked forward to by the patient with pleasure; and nothing tends more to produce this feeling than a cheerful demeanour. It is all very well to feel sympathy with the sufferer, but that is not sufficient; and the moral effect of the visit ought to be made to aid the action of the therapeutic measures. Much, however,

depends upon the condition and the mental morphology of the patient. In some cases the sympathy may preponderate with advantage; while with others the cheeriness is more acceptable.

There is and can be no question but that the usefulness of every medical man, and especially of young men, is indefinitely increased by general prudence, thoughtfulness, and good sense. The days are past when medical men were regarded as being all the better professional men for a profound ignorance on other subjects. It was once thought that such ignorance argued a certain attention to their profession, and the absence of distraction from it to other topics; but such is not the present prevalent opinion. A medical man, especially if he holds a respectable degree, and is a university man, is expected to possess much knowledge on many topics; to be able to speak well upon them, and to indicate in his conversation on ordinary topics that his mind is trained and cultivated; if such is not the case, the laity will naturally be sceptical about his culture in matters professional. The manners and conversation of the man on subjects within the range of its cognizance can be measured by the world at large; and upon these subjects it can form an opinion, when it feels incompetent to measure his capacities on matters purely professional. It gives a man weight with others to be generally well informed, and to show good sense in ordinary matters; and if he be lacking in these respects, a medical man will scarcely get credit for the professional knowledge he may really and actually possess.

Indeed this is no more than might be fairly expected. If a medical man indicates that he is but imperfectly informed on current questions, and still more be unconscious of his ignorance, observant persons will quickly take a note, and suspect his professional knowledge to be unsound. Of course a medical man may be of such a turn of mind as to take little interest in current topics, but he will be conscious that he is unacquainted with them; while in all probability he will give evidence of full acquaintance with the subjects in which he does take an interest. If, on the other hand, he talks confidently and yet loosely, with obviously imperfect knowledge, on ordinary topics, his professional utterances will not carry their proper weight with them.

The position of a medical man who endeavours to please everybody is beset with difficulties—a fact aptly illustrated by the following lines by an unknown author:—

He must not walk his rounds for fear his patients think him poor,
And dearly do they love to see a carriage at their door;
And if his horse is fat, "He must have little work to do."
And if he's lean the reason is, "He starves the poor old screw."
Should he call upon his patients every day when they are ill,
His motive plainly is, "To raise a great big doctor's bill."
If he visits them less frequently—thus less'ning their expense—
The chances are he'll be accused of wilful negligence.
He must work all day and half the night, and never say he's tired,
For the public look upon him simply as a servant hired,
And should he take a holiday, he'll find, when he comes back,
Some patients have resented it by giving him "the sack."
Concerning money, he must seem indifferent to be,
And folks will think he practises from pure philanthropy;
When we hear him about boasting of the guineas that he earns,
We wonder if they all appear in his income-tax returns.
About his own afflictions he must never say a word;
The notion of a doctor being ill is so absurd!
And when, perhaps from overwork, he's laid upon the shelf,
His sympathizing patients say: "Physician, heal thyself."

§ 255. It is a great matter to familiarize the mind with what is now called the natural history of disease, *i.e.* the progress of maladies through their different stages. There is the initial stage, the middle, and then the more advanced stages. As in consumption, for instance, there is first the stage of consolidation, then that of softening, and then that of formation of a cavity; in very fortunate cases there is further a falling in and cicatrization of the cavity. So, too, in Bright's disease, there is the early stage, of which there are few indications; and those only recognizable by the eye that has carefully educated itself to discern and note the early changes of what, in time, is distinct enough to a comparative tyro. There are the beginnings of morbid changes which can only be observed by those who have studied the marked and advanced changes, and so proceeded to a recognition of the earliest modifications. To the trained eye these indications are as pronounced, though hidden from others, as are the early manifestations of insanity visible to the skilled alienist physician, long ere they can be

recognized by the ordinary observer. Then there are objective and subjective phenomena which mark the establishment of the disease, and which are more generally known, such as a glistening ear-lobe, otolites, the deformed knuckle, &c., attacks of arthritis, of dyspepsia, of boils, of skin eruptions, or bronchitis, &c., with occasional fitful appearance of albumin in the urine. Ultimately there are atheroma, cardiac changes, with or without aortic valvulitis, failure of the circulation, the evidences of cardiac inability, as enlarged liver and spleen; congestion of the kidneys, with persistent albuminuria; general anasarca, &c. It is as desirable that the medical attendant should think out these changes in their order and rotation, as that the farmer should recognize the growth and changes in his crops in their order, according as the three or seven-year system is adopted. By such study the medical man will learn to see these evils far ahead, and learn to meet them; and this is a matter of immeasurable importance. Changes foreseen afar off may be met, headed, and arrested even, by prudent, well-applied measures. If the changes looming in the distance are recognized, suitable precautions can be taken; just as a ship may weather a point only discernible by a trained eye on the outlook, and not visible to ordinary ken, if seen early enough; but if not recognized or noted in time, there may be no means of avoiding the shipwreck then inevitable. The eye can only see what it has learned to see; and the youthful gaze may see nothing, though the eye is young and the vision keen, where to the duller eye of advanced life the face may be a written page, whose characters are both familiar and distinct. The tortuous temporal artery, its thickness indicating the kind of atheromatous change going on in it; the species of arcus senilis; the absence or presence of degeneration in the skin; the formation of the teeth; the fulness under the lower eyelid; the tremulousness of the tongue, or the twitching of a muscle—are to the trained eye all indications pregnant with information; but which convey no information to the eye which has not learned to see and note these matters, and to the mind which has not yet found their interpretation. It is indeed just the difference betwixt Egyptian hieroglyphics to him who can read these characters, and to him that cannot. To the one the

subject-matter is unfolded, to the other there is merely a series of undecipherable characters; which, however, might give the most valuable information if they could but be read. There is as yet no Rosetta stone by which young medical men can be taught to read readily the hieroglyphics of degenerative changes; and yet how strangely some men have learned to read for themselves these subtle indications, and taught themselves to interpret broadly their significance—even while unable to spell them out alphabetically. This forms a great portion of that individual experience so valuable and yet so untransferable. Careful observation and comparison of cases furnish in time a *répertoire* of experiences most valuable for the formation of prognosis, indeed

> "Till old experience doth attain
> To something of prophetic strain;"

and by the light of past experiences the old practitioner will often shadow out the future progress of a case with wonderful accuracy. In the strange forecasts of observant old men there is no "mystical lore," but rather a full-stored memory of past experience well culled; which, however, speaks out in the puzzling form of unconscious cerebration rather than in the intelligible form of conscious induction. For the young man, to whom such experience is impossible, its advantages can only be compensated by painstaking observation, extensive acquaintance with the experience of others, as found in their writings—for by such study youth may converse with the aged and with those who have passed away, and further, by thinking and pondering over the matter; until the subject has become one consistent intelligible whole, which can be recognized in its entirety, and yet be studied in detail in each part. Without such study, and the scientific use of the imagination to bridge gaps which cannot otherwise be got over, no young man can meet and hold his own with an older man of riper experience as regards the formation of a prognosis in chronic maladies; and still more, in that practically more valuable matter, in the selection of remedies and the laying down of a line of conduct to be followed, which will keep at bay and stave off for long mischief ultimately inevitable.

§ 256. As an illustration of the manner in which careful observation of the general surroundings of a malady may be made to supplement the information furnished by physical signs, and so enable a correct and proper diagnosis and prognosis to be made, the following considerations are permissible. Forms of disease closely allied are found to take on a totally different progress under diverse associated conditions. For instance, the pathological condition "dilatation of the heart," with its objective phenomenon "palpitation on effort," is a very different matter when found along with passing coexistent conditions than where it is a permanent state in a chronic invalid: and yet these do not differ so much from each other as they do from the dilatation of failing hypertrophy. Aortic stenosis and regurgitation differ so widely as regards their progress and the patient's prospects, that we might wonder at such diverse effects of a little connective tissue in the aortic valves, were it not for the importance of the situation of the new growth; and the well-recognized difference of an obstruction merely offered to the blood-flow from a muscular chamber and regurgitation into it—the influx of blood driven in by the aortic recoil, and not merely welling in, comparatively quietly, from the pulmonary vessels.

In illustration of what is just indicated, we may consider in detail the different progress of the pathological condition known as dilatation of the left ventricle, with its objective symptom, palpitation on effort; according as it occurs under different accompanying general conditions. The physical signs are diffused impulse, increased area of percussion, dulness, a weak and irregular action of the ventricle, a want of volume in the first sound; while the subjected symptoms are, dyspnœa easily excited, and incapacity for exertion. In so far the signs and symptoms agree and are common to all; but when we come to consider the more special peculiarities of each condition the points of difference come out strongly, and illustrate vividly the importance of the general conditions under which this pathological change, dilatation, is found; enabling us to estimate its significance, and to foreshadow the probable progress of the case.

First, we meet with dilatation and its usual signs and

symptoms in young men, with a distinct history of sustained over-exertion, of efforts made and maintained beyond the patient's physical powers. Hence he has dilatation of his left ventricle. This form is very amenable to treatment. Rest, good nutrition, digitalis and iron, and in a few months the patient is well and returns to labour. Imperfect cure is the exception and not the rule.

Secondly, we have dilatation in an elderly female, in whom it has existed for years. She is more or less of an invalid, and her capacity for exertion is very limited. It is unnecessary to go into any detail of a case so familiar to all. Here the condition is chronic, and that very chronicity carries with it a fair prognosis as to life, though the case is hopeless as to cure. It is like the chronicity of phthisis: the length of time the patient has actually lived with it holds out a prospect of life for a fair time longer—*i. e.* in the absence of any new symptoms indicating a change from the stationary condition. Here the treatment is palliative: rest is a *sine qua non*, for exertion is simply impossible; but quiet, a good regimen, a carefully supervised medical treatment, following up each varying change, and moderating each intercurrent ailment, will usually enable the patient to live for years. Recovery is scarcely within hope; though Fuller tells us that a course of iron, adhered to for years, has often removed all evidence of dilatation. The progress of dilatation is very different here from its course in the first division.

Thirdly, we meet with dilatation under totally different circumstances from either of the above divisions—namely, where pre-existing hypertrophy is being undermined by structural degeneration, and the muscular walls are yielding. It occurs chiefly in the latter stages of chronic Bright's disease, where simple hypertrophy unconnected with valvular disease is mostly found. To illustrate thoroughly the significance of dilatation under these circumstances will need a brief divergence from the subject-matter in hand—a rapid bird's-eye view of the preceding and causal changes.

The course of events is usually in the following sequence :—

Renal inadequacy, with accumulation of histolytic products in the blood. Spasm of the arterioles, from the effect of those

products upon the vaso-motor centre. Hypertrophy of the muscular walls of the arterioles from the persistent, oft-repeated spasm. Arteriole spasm and hypertrophy lead to obstructed blood-flow. Obstructed blood-flow induces hypertrophy in the left ventricle. The action of these two hypertrophied muscular ends of the arterial system produces over-distention of the elastic connecting arteries. This over-distention produces atheroma. Atheroma entails loss of arterial elasticity, and consequently impaired aortic systole. The aortic systole is the propelling power which drives the blood into the coronary vessels during the ventricular diastole; and impaired aortic systole leads to imperfect cardiac nutrition, structural degeneration, yielding of the decaying walls, and dilatation. In the induction of these last changes we must not overlook the assistance given by the degeneration of the coronary vessels. The dilatation here is a condition of the greatest gravity. It is neither a temporary nor yet a stationary chronic condition, as in the preceding forms; it is a degenerative change of the more serious nature, and its prognosis is of the most hopeless character. The atheromatous systemic arteries are not readily distensible, and the failing heart is every day less equal to the work entailed upon it. The hypertrophy which had maintained it in the requisite driving power is melting away, and nothing can restore it; indeed but little can be done even towards arresting the decaying process. Rest is imperative, and, along with palliative treatment, may for a brief period retard the downward progress; but it is only for a time. A process of degeneration is established whose march is simply irresistible.

Thus we see that one pathological condition may be found under totally different circumstances, the progress in each case being of an utterly dissimilar character. In each case, however, the progress may usually be fairly predicted if the different factors are taken into account—the actual heart changes weighed by the general co-existing condition. The grim significance of dilatation in the third division must never be underrated; and though at first the dilatation is distinctly blended with hypertrophy, it is not a chronic condition of combined hypertrophy and dilatation, the amount of hypertrophy lending an equivalent of hope; it is a decay of hypertrophy, whose arrest is

impossible. Every recurring examination of the patient tells of the progress of the new changes, and of the inadequacy—indeed too often futility—of our attempt to arrest them.

With relation to its possible constitutional origin should dilatation of the left ventricle be looked at on the one hand; with regard to its systemic consequences should it be viewed on the other: not only the exact form of the disease and its complications, but the reparative or resistent powers of the patient, the necessity for exertion or the practicability of rest, the exigencies of the individual—all must be included and appraised; if our estimate of the probable progress is to contain the elements of success and not of failure, and the advice given to the patient to be of value to him, and not a possible source of danger. It is only when our view embraces all these factors that even a correct diagnosis is of any real value; without them it is little, if anything, more than a mere feat of intellectual legerdemain.

§ 257. The whole subject of the changes which commence in imperfect blood depuration, the effect upon the circulation, the consequences and outcomes of that again, forms the most complete and illustrative morbid process with its different stages and order of evolution, with which we are yet acquainted; and so possesses an intense pathological interest: and something more than mere pathological interest to the far-seeing practitioner, who, recognizing the early changes, knows what will follow, and so takes his measures accordingly. In such cases to be fore-warned is to be fore-armed indeed; and as the knowledge of our profession in the abstract grows, so will each man in the concrete be more able to interpose, and more or less effectually arrest morbid processes; instead of merely relieving imperfectly the disagreeable sensations and symptoms of an established and irreparable condition. It is this power to prevent, which a good knowledge of pathology, as distinct from mere morbid anatomy, gives, that makes it so valuable to the practitioner. If the pathological facts exist as mere facts, they are like beads unstrung; or the varied materials gathered together for the erection of a stately mansion, but which remain in more or less chaotic condition because the architect who possesses the plan is absent.

It is very desirable for many ends, prognostic as well as therapeutic, that a well-defined acquaintance with the progress of chronic maladies should exist. Such knowledge will often point to something looming in the future which may be met, and its shock lessened, if escape be impossible; on other occasions it will indicate that the time for certain measures to be useful has passed away. As it is impossible for a young practitioner to watch chronic cases for himself; and even if he chooses to do so his knowledge must but keep pace with the slow progress of his cases, and the advance of general knowledge will in the meantime have left him far astern; so it becomes imperative that he should erect for himself a chart of the progress of chronic maladies, of which but intermittent fragmentary and transient views are permitted by circumstances: so that from an occasional isolated view of a case he may be able to construct a tolerably correct idea of the past history of the case before him, and still more of its probable future. No one can do this who has not laboured hard as well as willingly at the subject. The darkness which hangs over the past, and shrouds the future from light, must be illumined by acquaintance with the progress of similar cases,—by knowledge of the subject in its entirety. In the same way that a geologist, when finding a certain fossil in a shale-bed, tells confidently from its presence there that the shale-bed points to no coal-seams beneath; because he knows well that this fossil is found only in the earliest coal formations; and consequently knows that the shale-bed in which it is found points to the exhaustion of the coal-seams, and not to their commencement: so must the observant medical practitioner learn to recognize by certain signs that the case before him has passed certain points, and entered upon certain stages. The commencement of a mitral murmur in a case of old-standing aortic disease; the inauguration of a tricuspid "whiff" in long-established mitral disease, furnish such landmarks—are indeed the milestones of morbid progress. By such indications in the course of many chronic maladies we are enabled to calculate the position of the disease as well as the prospects of the patient: to ascertain that the time has come when curative measures must give way, and palliative measures take their place; when there no longer exists a foothold for hope that the

injury can be compensated, or that an approach to approximative cure can be entertained as potential; and when all our energies must be bent to the delay of the end, now distinctly and clearly inevitable. All therapeutics, whether curative or palliative, to be rational and successful, must rest upon a sound comprehension of the nature of the malady.

§ 258. There is much still to be done, much to be learnt, much to be investigated, before the science of treatment attains its ultimate evolution and maximum of utility. But if such is the case there exist also ardent minds, enthusiastic and undaunted workers, who form an undying guild, which will, in time and with infinite patience, lay deep and firm the foundations of a rational therapeusis; and erect thereupon a structure which will comprise and hold in intelligent array and serried order, the facts gathered by a long-existing and industrious empiricism; as well as the information given by enterprising and well-maintained physiological inquiry.

The prospect contains much to cheer us, much to encourage us to work and wait. If the work of the individual has no apparent fruition, and he passes away without the gratification of seeing the desired outcomes of his labours, there exists the consolation and the comfort that good honest work is never ultimately lost; and that what has been done by him will ultimately bear fruit in the hands of another; and that the sum total of human knowledge is the better for him and his work; even though the fruition be delayed until he himself is forgotten in the silent tomb—unconscious of the busy life which is reaping what he has sown. We, living now, receive the benefits accruing from the work of past toilers; and so in return must we do something for those who will follow us, and do it too without a grudging or repining spirit, but simply with an honest consciousness of duty—done and to be done. There is a certain element and warp of selfishness in the web of the life of those who take what medicine has slowly accumulated, and use it merely for their own advantage and their individual interests: without a thought of making some return. Those who fell the oak when full-grown should strive at least to plant, even if they do not succeed in planting, an acorn. He that planted the acorn of the tree they profit by did not hope to see

its mighty trunk on the wagon which conveys it to the timber-merchant's yard—but perhaps he witnessed the fall of oaks some nameless and forgotten man had planted long before him. So, if we feel that others must enter into the fruition of our labours, we must not repine; we reap that which others before us have sown. The personal benefit is the consciousness of duty done, which is far more than hope of reward—the consciousness that we too have added our brick, and laid it fairly true and well, in the building of the temple of knowledge—that the whole is the aggregate of individual bricks, and that each one has its place and its value.

There are those, however, who would say in the matter of therapeutics:—"Generation after generation still sends forth new speculators—ardent, sanguine, and undiscouraged by the failure of their predecessors—to toil at the same Sisyphean task, to be met by the same impassable bounds, to catch the same vanishing and partial glimpses, to be conscious of the same incompetency, to confess to the same utter and disheartening defeat. One after another they retire from the voyage of discovery weary and baffled—some in the exasperation of mortified ambition—some having learned the rich lesson of humility; a few in faith and hope—many in bewilderment and despair—but none in knowledge—scarcely any (and those only the weakest) even in the delusion of fancied attainment." But in this scepticism, too often but the thin veil which scarcely cloaks and utterly fails to conceal their ignorance, they are not justified by the facts of the case. Therapeutics have made steady advances since the study of physiology has opened up for us a knowledge, albeit yet very imperfect, of the normal processes of the body; and in doing so has given direction to pathological research and a form and order to the facts of morbid anatomy; as well as permitted of the investigation of the action of remedies by the more precise method of experimental research; so checking and correcting the vaguer conclusions furnished by clinical observation. Already they occupy a comparatively firm foundation of assured data; and round this nucleus an accretion of facts is forming: and if we have yet much to learn, we are at any rate conscious of our ignorance; and in possession of some lines of research which are trustworthy and to be relied upon.

There is a great future before us in the struggle with disease; and we may reply to those who scoff, in the following sentences from the writer just quoted—having some reservations about the strict applicability of the first part of the commencing sentence:—"The true solution is perhaps no nearer to us than before, but false ones are disproved and discarded; positive science, which is always advancing, lends its aid not so much to disperse the darkness as to expose the *ignes fatui* which we mistook for light; and we are brought into a more hopeful state of progress and sent further on our way, in proportion as wider knowledge and exacter observation unroofs one after another of the errors in which we had sought a shelter, and fancied we could find repose. Perhaps, after all, our discomfitures hitherto are attributable less to the inadequacy of our speculative faculties than to the poverty of our positive knowledge; the problem may appear insoluble simply because we have not yet accumulated the materials necessary for approaching it; and the higher branches of physiology may yet point the path to the great secret." [1]

[1] Gregg, *Enigmas of Life.*

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